ARUP

CWTC Multi Family ICAV acting solely in respect of its sub fund DBTR SCR1 Fund

Bailey Gibson

Wind Microclimate Assessment

Reference: 283700-ARUP-RP-WD-XX-XX-0001

P02 | 7 June 2022

Job number 283700-20

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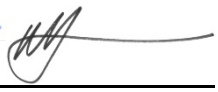
Document Verification

Project title	Bailey Gibson
Document title	Wind Microclimate Assessment
Job number	283700-20
Document ref	283700-ARUP-RP-WD-XX-XX-0001
File reference	

Revision	**Date**	**Filename**			
P02	7 June 2022	**Description**			
			Prepared by	**Checked by**	**Approved by**
		Name	Aviva Opsomer /Rubina Ramponi	Reamonn MacReamoinn	Peter Flynn
		Signature			
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		Description			
			Prepared by	**Checked by**	**Approved by**
		Name			
		Signature			
		Filename			
		Description			
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		Name			
		Signature			

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Executive Summary

This application relates to a proposed mixed-use strategic housing development (SHD) on a site of approx. 5.5 hectares in Dublin 8. It includes all of the former Bailey Gibson site and a small portion of the former Player Wills site, both of which are owned by the Applicant, CWTC Multi Family ICAV acting solely in respect of its sub fun DTBR SCR1 Fund. The balance of the proposed development site relates to land owned by Dublin City Council (DCC) known locally as the 'Boys Brigade pitch' and part of the St. Teresa's Gardens site, together with DCC controlled public roads.

A comprehensive description of the proposed development is set out in the Planning Statement. The Statutory Notices should also be referenced.

Briefly, it is proposed to demolish the existing vacant buildings and structures on the Bailey Gibson site to make way for development of 345 new homes across 5 blocks, BG 1 - BG 5, ranging in height from 2-7 storeys. The residential blocks will be contained within the Bailey Gibson site. The typology is predominantly apartments with 4 townhouses proposed in block BG5.

- All apartments have private amenity space. At ground floor this is in the form of terraces and on upper levels, balconies. Each of BG1-BG4 have communal amenity areas either as a courtyard or podium area.
- Tenant amenities and facilities are proposed in the BtR blocks and include a gym, co-working space, kitchen/lounge areas, concierge, and waste facilities.
- Over 2 hectares of public open space including a multi-sport play pitch, a playground, 'St. Teresa's Playground', a boulevard, 'St. Teresa's Boulevard', a park, 'Players Park', a plaza, 'Rehoboth Plaza'.
- The proposed non-residential uses include in blocks BG1 and BG2 commercial units that have the capacity to support daily living needs e.g., a shop, pharmacy and professional services. A creche with capacity for approx. 60 children. In block BG2 the design includes floorspace for a café/restaurant/bar.

This report assesses the impact of the proposed development on the wind conditions affecting pedestrian activities within and surrounding the development, and describes the methods used to assess these impacts in terms of pedestrian comfort and safety (distress). The assessment of discomfort and distress of pedestrians has been carried out in accordance with the Lawson Comfort Criteria [1].

The study is based on the drawings and massing models provided by Henry J Lyons Architects, the landscaping plan provided by Niall Montgomery + Partners Landscape Architects, and Arup's previous extensive experience of wind studies around buildings.

The objectives of the wind assessment are as follows:

- To ascertain the level of pedestrian wind comfort and distress at sensitive receptors (i.e. public spaces, entrances, walkways etc.) within the proposed development;
- To evaluate the effectiveness of landscaping elements in mitigating uncomfortable and distressing wind conditions within areas of interest and, as appropriate, to propose additional measures that will aid pedestrians in navigating through the residual adverse wind effects; and
- To report on the environmental wind conditions associated with the proposed development.

The local wind climate was determined from historical meteorological data recorded at Dublin Airport. The prevailing wind in Dublin is from the southwest. These winds are relatively warm and often bring rain. The winds from the east are not as common as the westerlies, however, they are relatively cold, which can make them as annoying as the stronger westerlies. The Wicklow mountains to the south of Dublin influence the wind microclimate in the vicinity of Dublin and tend to shelter the city from southerly winds. In order to account for differences in the terrain exposure, the local wind data from Dublin Airport was transposed to the development site using the ESDU (Engineering Sciences Data Unit) methodology, which is compatible with Irish practice for wind loading.

The conclusions of the Bailey Gibson wind microclimate study are as follows:

- Overall, the proposed development is expected to provide a suitable environment for pedestrians and occupants to carry out a wide variety of ‘sitting’, ‘standing’ and ‘strolling’ activities.
- Wind mitigation strategies have been adopted throughout the design to reduce the windiness across the site and to keep the wind conditions within acceptable limits. The building massing shelters the courtyards and the shared open spaces in the residential areas from the prevailing winds. Overall, the entrances are in sheltered locations, and some have additional recesses. Most balconies are provided with solid balustrades, and canopies and side screens are part of the design of the top-floor balconies in BG1.
- The wind conditions estimated at most of the key locations along the thoroughfares within and adjacent to the proposed development are considered suitable for their intended use. The wind conditions along a section of the walking path connecting Players Park to the multi-sport playing pitch are affected by downdraft off the tallest tower of the Player Wills development. These wind conditions are in marginal exceedance of the distress criteria for up to 3 hours per year. This would be considered a slight effect.
- The wind conditions estimated at the primary entrances of the proposed development meet the ‘standing’ limit and are suitable for the intended use.
- The wind conditions estimated at most of the proposed sitting locations in the public open spaces are within the ‘sitting’ to ‘standing’ range and are expected to be ‘comfortable’ for standing and short-term seating, like bench seating use.
- The impact of the possible future development (see Section 5) on the wind conditions around the proposed development is expected to be not significant.
- The possible future development may have a beneficial impact in the passage connecting Players Park to the multi-sport playing pitch, where the additional massing provides more shelter from the prevailing winds.

1. Introduction

1.1 Overview

This report assesses the impact of the proposed Bailey Gibson development on the wind conditions affecting pedestrian activities within and surrounding the site. The report describes the methods used to assess these impacts in terms of pedestrian comfort and safety (distress). The assessment of discomfort and distress of pedestrians has been carried out in accordance with the Lawson Comfort Criteria (see Lawson Comfort Criteria).

The mixed-used strategic housing development is located along South Circular Rd in Dublin 8, about 1.8 km to the southwest of the city centre. The site is part of a larger development initiative for the area that includes the sites of Player Wills, St. Theresa's Gardens and a DCC led future development to the north and east of the site. The site is surrounded by low-rise buildings to the south and south-west. The proposed buildings comprise of five blocks ranging from 2 to 7 storeys tall (Figure 1). The presence of taller buildings among lower buildings provides the potential for windiness in the surrounding areas and within the site. The windiness depends on both the massing of the buildings within their surroundings, their orientation with respect to the wind, and the local wind climate.

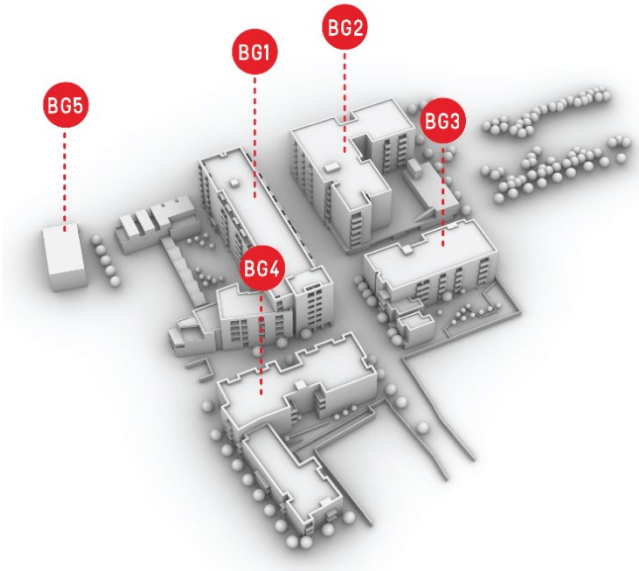


Figure 1: View of the proposed mixed-used strategic housing development

The study is based on the drawings and massing models provided by Henry J Lyons Architects, the landscaping plan provided by Niall Montgomery + Partners Landscape Architects, and Arup's previous extensive experience of wind studies around buildings.

1.2 Objectives

The objectives of the wind assessment are as follows:

- To ascertain the level of pedestrian wind comfort and distress at sensitive receptors (i.e. public spaces, entrances, walkways etc.) within the proposed development;
- To evaluate the effectiveness of landscaping elements in mitigating uncomfortable and distressing wind conditions within areas of interest and, as appropriate, to propose additional measures that will aid pedestrians in navigating through the residual adverse wind effects; and
- To report on the environmental wind conditions associated with the proposed development.

1.3 Study Methodology

It is important to understand the wind microclimate around a proposed development in order to understand the level of pedestrian comfort. The assessment has been undertaken in the following key locations:

- Thoroughfares
- Entrances and Standing Areas
- Public Seating and Open Spaces
- Balconies and Rooftop Terraces

1.4 Lawson Comfort Criteria

The criteria used to describe windiness in this study are those of TV Lawson of Bristol University, extracted from "The evaluation of the windiness of a building complex before construction", TV Lawson, London Docklands Development Corporation. These are used widely in Ireland, UK and around the world.

The acceptability of windy conditions is subjective and depends on several other factors, including but not limited to, normal clothing for the time of the year, expectations of the wind environment, air temperature, humidity and sunshine and most notably the activities to be performed in the area being assessed. The Lawson Criteria describe acceptability for particular activities in terms of 'comfort' and 'distress' (or safety). Acceptable conditions for various activities in order of increasing windiness are described in Table 1.

Gusts cause the majority of cases of annoyance and distress and are assessed in addition to average wind speeds. Gust speeds should be divided by 1.85 and these "gust equivalent mean" (GEM) speeds are compared to the same criteria as for the mean hourly wind speeds. This avoids the need for different criteria for mean and gust wind speeds.

Table 1: Comfort Criteria as Defined by TV Lawson

Activity	Description	Wind speed to be exceeded less often than 5% of the year (m/s)				
		0 – 4	4 – 6	6 – 8	8 – 10	> 10
'Sitting'	Regular use for reading a newspaper and eating and drinking					
'Standing'	Appropriate for bus stops, window shopping, building entrances, and public amenity spaces such as parks					
'Strolling'	General areas of walking and sightseeing					
'Business walking'	Local areas around tall buildings where people are not expected to linger					

Note: *A classification of 'business walking' does not mean that a location will never be suitable for 'sitting', however, it is likely to occur relatively infrequently.*

Legend

Satisfactory

Tolerable

Uncomfortable

1.4.1 Comfort Levels

The onset of discomfort depends on the activity in which the individual is engaged and is defined in terms of a mean hourly wind speed (or GEM, see above) which is exceeded for 5% of the time. The conditions, as described in Table 1, are the limiting criteria for comfort. For ideal conditions, the windiness will be a category better than outlined above. For more sensitive activities, such as regular use for external eating, conditions should be well within the 'sitting' category. Ireland is a windier climate than the UK, where these criteria were

developed. It is generally accepted that residents in windier climates are more resilient to stronger winds. Therefore, a slight exceedance of the limiting criteria for comfort is not considered significant.

1.4.2 Distress Levels

There is a criterion to define the onset of distress. For the 'General Public', this is equivalent to an hourly mean speed of 15 m/s and a gust speed of 28 m/s to be exceeded **less often than once a year**. This is intended to identify wind conditions which less able individuals or cyclists may find physically difficult. Conditions in excess of this limit, may be acceptable for optional routes and routes which less physically able individuals are unlikely to use.

Table 2: Distress Criteria as defined by TV Lawson

Activity	Description	Wind speed threshold to be exceeded less often than once a year (m/s)
General Public Access	Above which the less able and cyclists may at times find conditions physically difficult	15
Able-bodied Access	Above which it may become impossible at times for an able-bodied person to remain standing	20

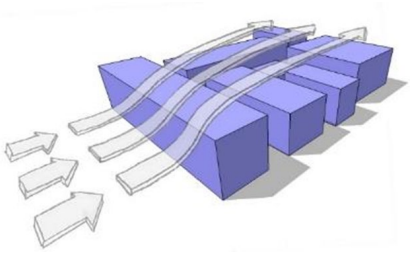
There is a further limiting distress criterion beyond which even 'Able-Bodied' individuals may find themselves in difficulties at times. This corresponds to a mean speed of 20 m/s and a gust speed of 37 m/s to be exceeded less often than once a year. Aerodynamic forces may exceed body weight in stormy conditions, which makes it difficult for anyone to remain standing. Where wind speeds exceed these values, pedestrian access should be limited.

1.5 Key Flow Mechanisms

There are certain flow patterns that can result in increased flow velocities. The main flow mechanisms of concern are described below:

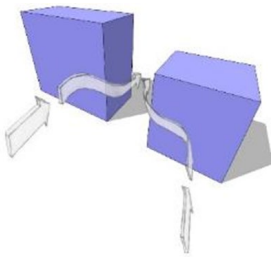
Exposure and Shelter

When buildings of similar height are in close proximity to each other, the first line of buildings can shelter the buildings behind from the wind. However, if the gap is relatively large, the building upstream may not provide adequate shelter. In this case, the higher velocity high level wind from above may descend to ground and therefore, this may create an inclement environment for pedestrians.



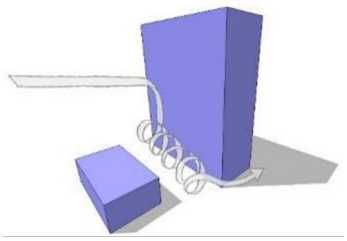
Funnelling/Channelling

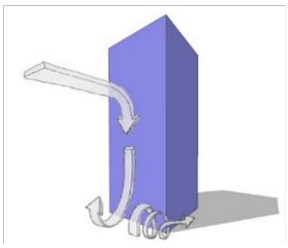
When the gap between buildings is relatively narrow in comparison to their overall width, a large volume of wind is forced through the narrow opening. It is necessary for the wind speed to increase through the opening, which can result in discomfort for pedestrians.



Downdraft

When buildings are considerably taller than the other buildings in their surroundings, they can re-direct the high-speed winds that they interact with at a high level down to ground in the form of a downdraft with standing vortex. The downdraft effect can be further exacerbated by lower-level buildings in close proximity upstream.





1.6 Computational Fluid Dynamics (CFD)

Computational Fluid Dynamics (CFD) is a numerical technique intended to simulate various phenomena related with fluid flow. The analysis includes three main stages: pre-processing, CFD simulations and post-processing. The CFD simulations performed in this study were made using the software OpenFOAM with a 3D steady-state Reynolds' Average Navier-Stokes (RANS) approach, commonly used in CFD studies of this kind.

2. Existing Receiving Environment

2.1 Site Location and Surrounding Areas

This application relates to a proposed mixed-use strategic housing development (SHD) is on a site of approx. 5.5 hectares in Dublin 8. It includes all of the former Bailey Gibson site and a small portion of the former Player Wills site, both of which are owned by the Applicant, CWTC Multi Family ICAV acting solely in respect of its sub fun DTBR SCR1 Fund. The balance of the proposed development site relates to land owned by Dublin City Council (DCC) known locally as the 'Boys Brigade pitch' and part of the St. Teresa's Gardens site, together with DCC controlled public roads.

The application area is predominately within Strategic Development Regeneration Area (SDRA) 12, St. Teresa's Gardens & Environs as identified in the Dublin City Development Plan 2016-2022. The part of the proposed development site not within SDRA 12 relate to works proposed in the public roads surrounding the site, South Circular Road, Donore Avenue and Rehoboth Place.

The site is adjacent to the proposed Player Wills development to the east, which is included in the existing context for the current assessment. The future Player Wills Phase 2 development is expected to the east of the site, while a development by DCC is planned for the land to the north of the building structures on the former Bailey Gibson site. Both these developments are considered part of the cumulative (future) context.

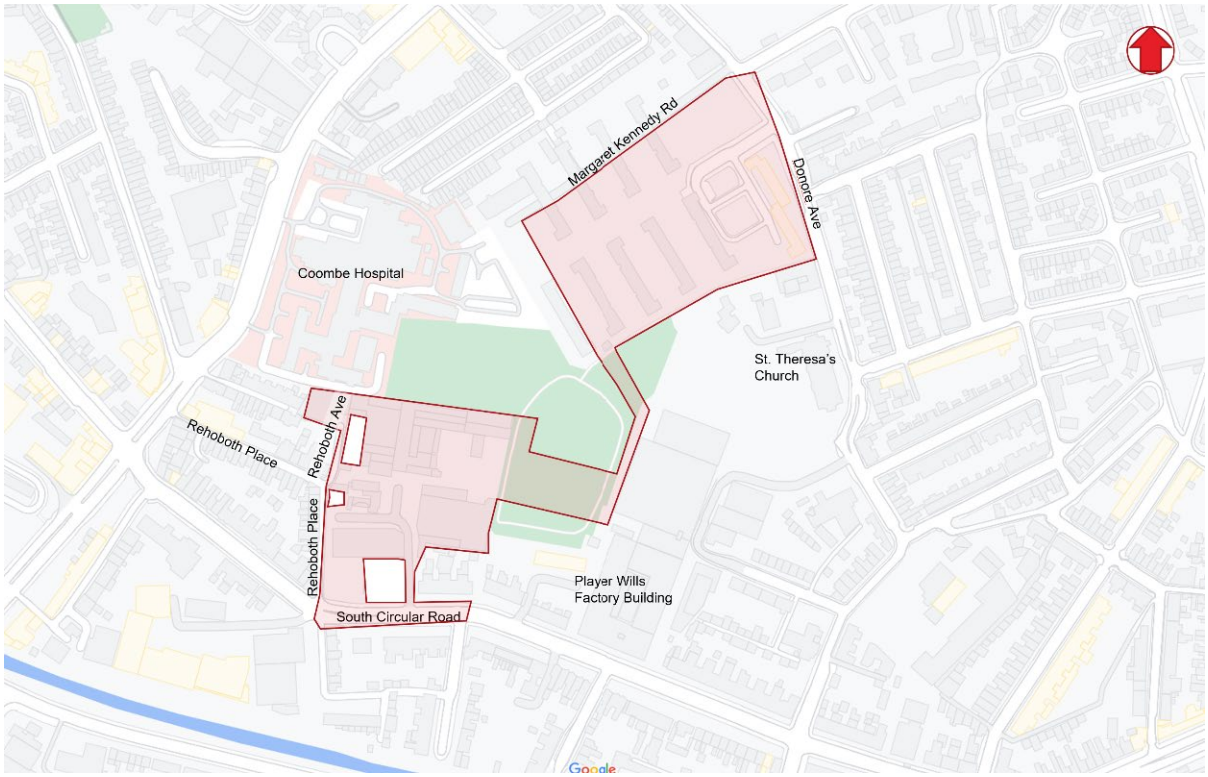


Figure 2: Site context (source of the base map: Google Maps)

2.2 Proposed Development

A comprehensive description of the proposed development is set out in the Planning Statement. The Statutory Notices should also be referenced.

Briefly, it is proposed to demolish the existing vacant buildings and structures on the Bailey Gibson site to make way for development of 345 new homes across 5 blocks, BG 1 - BG 5, ranging in height from 2-7 storeys. The residential blocks will be contained within the Bailey Gibson site. The typology is predominantly apartments with 4 townhouses proposed in block BG5.

Figure 3: Top view of the proposed development (Source: Bailey Gibson SHD2 Urban and Architectural Design Statement, June 2022)

This is a mixed tenure scheme, with 292 units proposed as Build to Rent (BtR) across blocks BG1-BG3 and 53 units proposed as Build to Sell (BtS) in blocks BG4 and BG5. It is proposed to deliver 34 social and affordable homes as part of the overall total.

All apartments have private amenity space. At ground floor this is in the form of terraces and on upper levels, balconies. Each of BG1-BG4 have communal amenity areas either as a courtyard or podium area.

Tenant amenities and facilities are proposed in the BtR blocks and include a gym, co-working space, kitchen/lounge areas, concierge, and waste facilities.

Over 2 hectares of public open space including a multi-sport play pitch, a playground, ‘St. Teresa’s Playground’, a boulevard, ‘St. Teresa’s Boulevard’, a park, ‘Players Park’, a plaza, ‘Rehoboth Plaza’.

The proposed non-residential uses include in blocks BG1 and BG2 commercial units that have the capacity to support daily living needs e.g., a shop, pharmacy and professional services. A creche with capacity for approx. 60 children. In block BG2 the design includes floorspace for a café/restaurant/bar.

In total there are 89 car parking spaces allocated to the proposed apartments and all are contained within the Bailey Gibson site. Apart from 1 space at podium level, the parking is contained within a basement. Additionally, 10 ‘Go Car’ spaces are proposed at podium level for residents use only. Each of the 4 townhouses has 1 on-curtilage car parking space.

Visitor parking is at street level and the proposed sport pitch will be serviced separately by new spaces on the public roads. The scheme includes set down parking for the creche, a loading bay for deliveries and coach parking area.

Provision is made for disabled parking, electric vehicle charging, a car sharing scheme and motorcycle parking.

784 spaces are proposed for cycle parking including secure residents parking, visitor parking and spaces for cargo bicycles.

Other works include the development of a network of streets across the proposed development site that will link with other sites within SDRA 12 and into the wider street network of Dublin 8. Improvement works within existing local streets to facilitate access and safe movement.

Ancillary development works includes the construction of electricity substations, meter rooms, plant rooms at basement level, waste storage areas, solar photovoltaics, drainage, landscaping, and lighting.

Figure 4 shows the entrances and private upper-level spaces (balconies, terraces, and the elevated courtyard of the proposed Bailey Gibson development buildings). Figure 5 shows the main pedestrian thoroughfares and seating areas within and around the site.

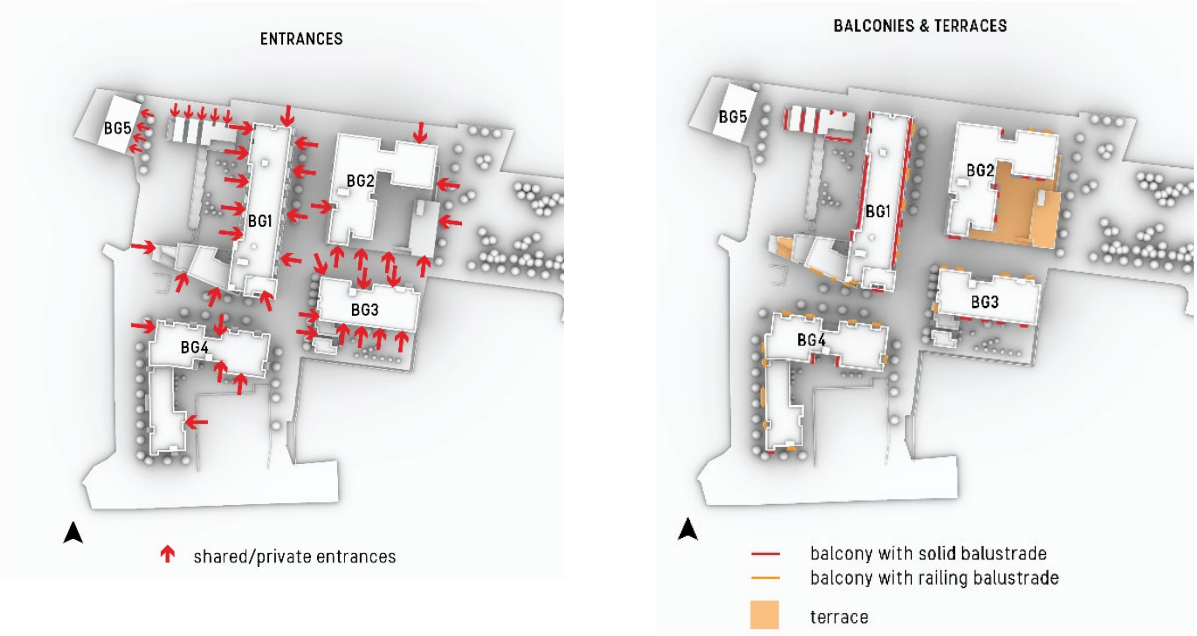


Figure 4: Location of the main entrances (left), balconies and terraces (right)

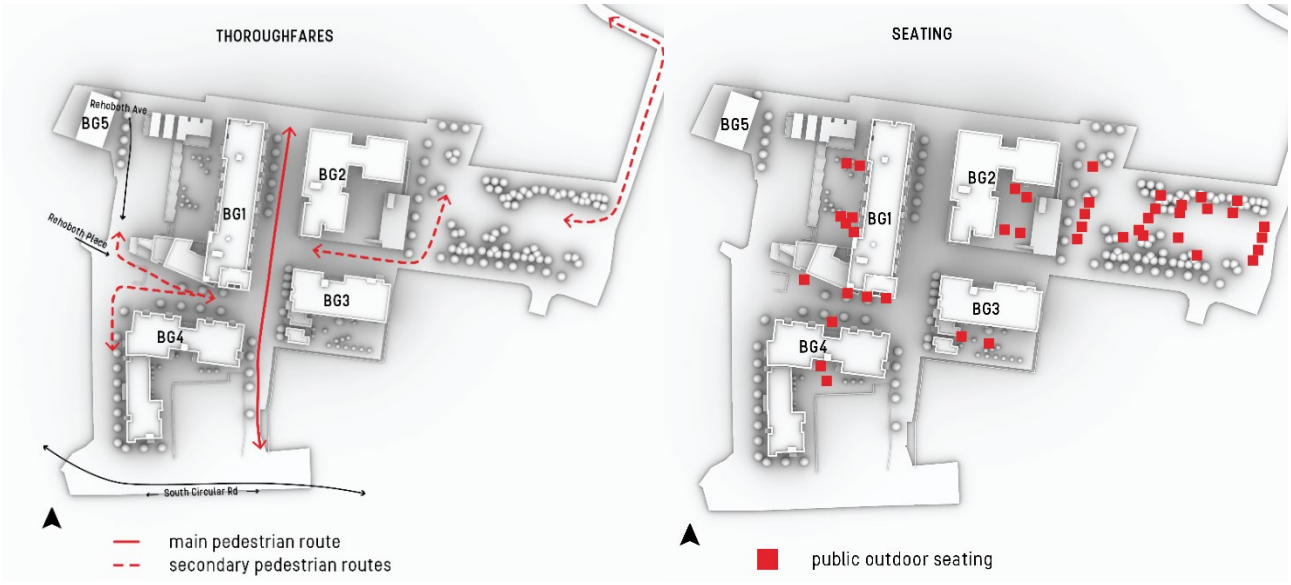


Figure 5: Location of the main thoroughfares (left) and seating areas (right) in the proposed development.

2.3 Wind Microclimate

The local wind climate has been evaluated based on historical meteorological data recorded at Dublin Airport. The meteorological data, associated with the hourly wind speeds recorded over a 21-year period between 1999 and 2020, have been analysed. The data is recorded at a weather station at the airport, which is located 10 m above ground.

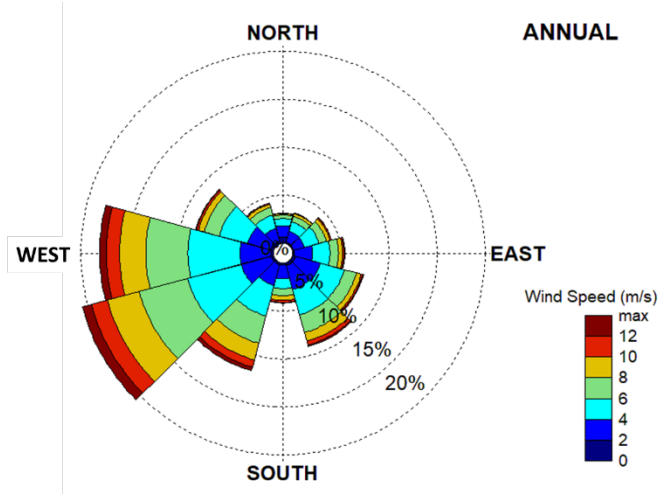


Figure 6: Dublin Airport Wind Rose

The prevailing wind in Dublin is from the southwest to west. These are relatively warm and often bring rain. The winds from the east are not as common as the westerlies, however, they are relatively cold, which can make them as annoying as the stronger westerlies.

In this study, winds were considered to approach from twelve distinct sectors. A Weibull distribution was fitted to the wind data for each sector through the adoption of an appropriate dispersion parameter, c, and shape parameter, k. The 95th percentile and 'once-a-year' wind speeds were derived from the subsequent cumulative Weibull distributions.

In order to account for differences in topography, the local wind data from Dublin Airport was transposed to the development site using the ESDU (Engineering Sciences Data Unit) methodology, which is compatible with Irish practice for wind loading. The transformation considers the exposure of the site, which is a measure of the terrain roughness (i.e. size and number of obstacles) upstream of the site. The exposure is dependent on the direction of the oncoming wind.

3. Proposed Development in Existing Surroundings

An analysis has been undertaken to quantify the wind comfort and safety levels at key pedestrian locations around the proposed development in the existing and permitted building context, as illustrated in Figure 7. This includes the permitted Player Wills application adjacent to the site as illustrated in the figure below. This scenario does not consider the effect of the proposed landscaping that will be discussed in Section 3 and the cumulative (future) developments that will be discussed in Section 4.

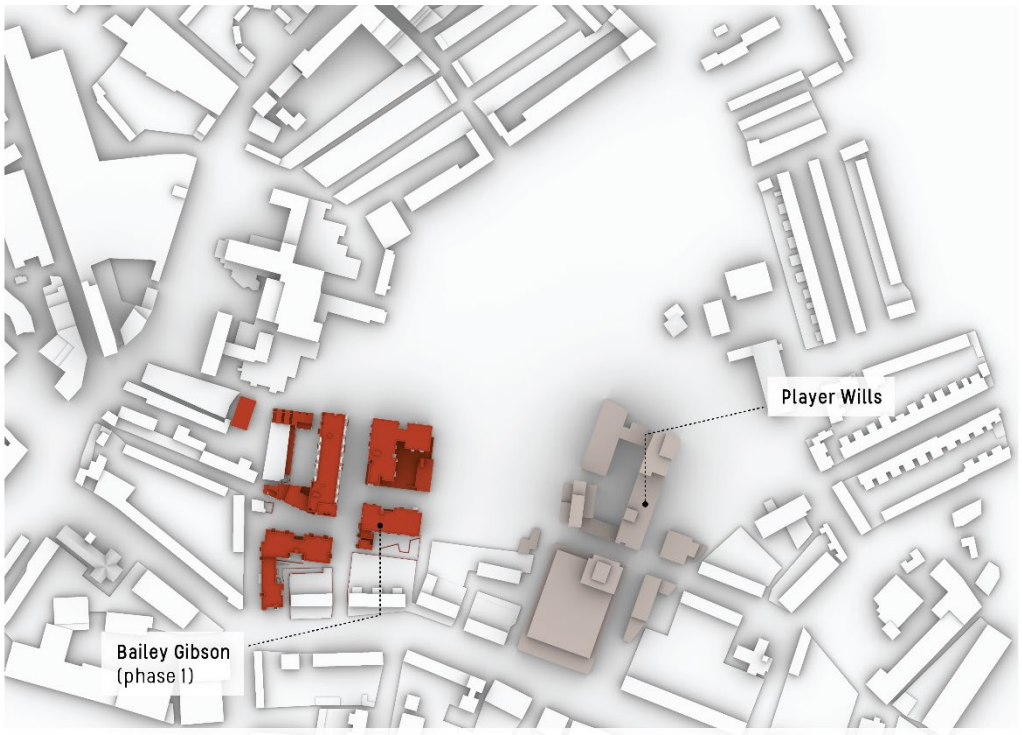


Figure 7: Top view of the proposed development and the existing surroundings as represented in the CFD model

The proposed development includes several design features (some examples shown in Figure 8) that contribute to the creation of a comfortable pedestrian wind microclimate on the site. The building massing shelters the courtyards and the shared open spaces in the residential areas from the prevailing winds. Overall, most entrances are in sheltered locations, and some have additional recesses. Most balconies are provided with solid balustrades, and canopies and side screens are part of the design of the top-floor balconies in the BG1 Block.

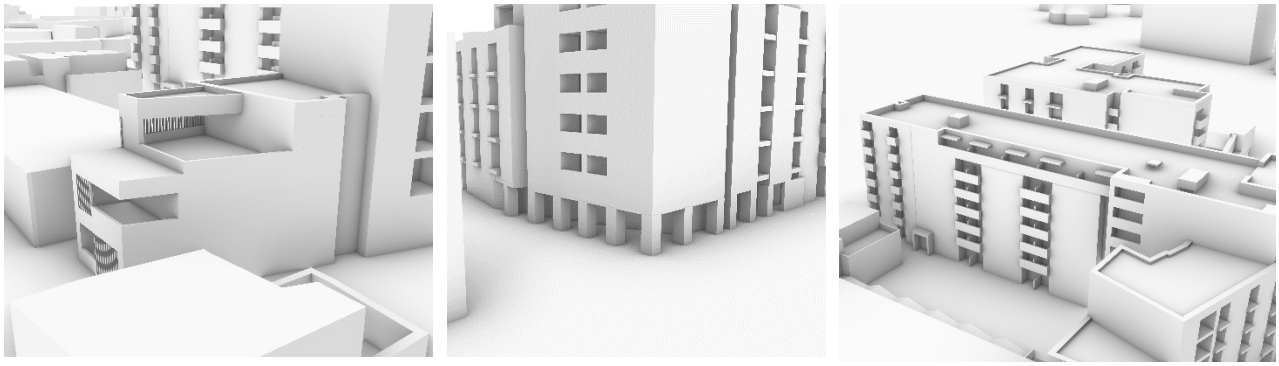


Figure 8: Examples of design features of Block BG1 that have a positive impact on the wind conditions: Slatted screens (left), recessed building entrance (centre), canopies and side screens on the rooftop terraces (right) BG1

3.1 Overview

Figure 9 and Figure 10 show an overview of the Lawson wind speeds at key locations along the thoroughfares and on the sitting areas at the publicly accessible spaces across the site. Overall, the proposed development provides a suitable environment for pedestrians and occupants to carry out a wide variety of 'sitting', 'standing' and 'strolling' activities.

The wind conditions around the proposed building blocks are driven by their massing and orientation. The southwest block BG4 is lower than the adjacent block BG1, causing the prevailing southwesterly winds to skim over the roof of BG4, downdraft off the southern façade of the taller BG1 and accelerate around its corner along the main north-south avenue. Although this position is likely to experience slightly higher winds than the surrounding areas, the wind conditions are expected to be in a 'strolling' range and suitable for pedestrian circulation.

The wind conditions around the multi-sport playing pitch to the north and the connecting passage are driven by existing and permitted context buildings. These conditions are estimated up to the 'standing' range and suitable for the intended use.

The sections below will discuss more closely the wind conditions along the throughfares and sitting spaces around the proposed building blocks and Players Park.

Figure 9: Overview of the Lawson wind speeds at key locations along the thoroughfares around the site in existing surroundings

Figure 10: Overview of the Lawson wind speeds at key sitting locations around the site in existing surroundings

3.1.1 Thoroughfares

The wind speed estimated along the throughfares around the proposed building blocks are, for the most part, up to 6 m/s and within the comfortable range for 'walking'. Players Park to the east of the buildings is also expected to be comfortable for outdoor sitting and walking activities.

The wind conditions estimated along a short section of the walking path connecting Players Park to the multi-sport playing pitch are affected by downdraft off the tallest tower of the Player Wills development. This tower is considerably taller than the surrounding buildings, leading to stronger pedestrian-level wind speeds at its base. These wind conditions are in marginal exceedance of the distress criteria for up to about 3 hours per year.

Figure 11. Lawson wind speeds at key locations along the thoroughfares of the proposed development in existing surroundings

Figure 12: Lawson criteria at key locations along the thoroughfares of the proposed development in existing surroundings

3.1.2 Public Seating Spaces

The wind speeds estimated along the majority of the public seating spaces around the proposed building blocks and Players Park are up to approximately 6 m/s and in the 'sitting' to 'standing' range (Figure 13). These wind conditions are very common in Dublin and expected to be 'comfortable' for standing and short-term sitting, like bench seating use. There is an expectation to use these spaces in good weather conditions, which would improve on the acceptability of the estimated windiness (Figure 14).

Figure 13. Lawson wind speeds at key locations of the public open spaces within the proposed development in existing surroundings

Figure 14: Lawson criteria at key locations of the public open spaces within the proposed development in existing surroundings

3.2 Block BG1

3.2.1 Entrances

Most primary entrances of Block BG1 are recessed from the building façade and protected from the prevailing winds. The wind speeds estimated at these locations are up to 5 m/s and considered suitable for their intended use.

Figure 15: Lawson wind speeds (left) and Lawson criteria (right) at the primary entrances of BG1

3.2.2 Balconies

The balconies are considered private spaces for the residents. The east-facing and south-facing balconies in Block BG1 (Figure 17) are located along the main north-south thoroughfare through the site and recessed from the building façade. The wind speeds are estimated up to about 4 m/s and considered suitable for their intended use. The top-floor balconies feature canopies and side screens that contribute to maintaining wind conditions in an acceptable range. The three south-facing upper balconies recorded slightly higher wind speeds, which may be uncomfortable for 'sitting' at certain times of the year.

The west-facing balconies are within the 'sitting' to 'standing' range and reasonable for good-weather use. The larger balconies of the lower block on the northwest corner of the site (Figure 19) are also expected to be relatively calm and suitable for outdoor seating.

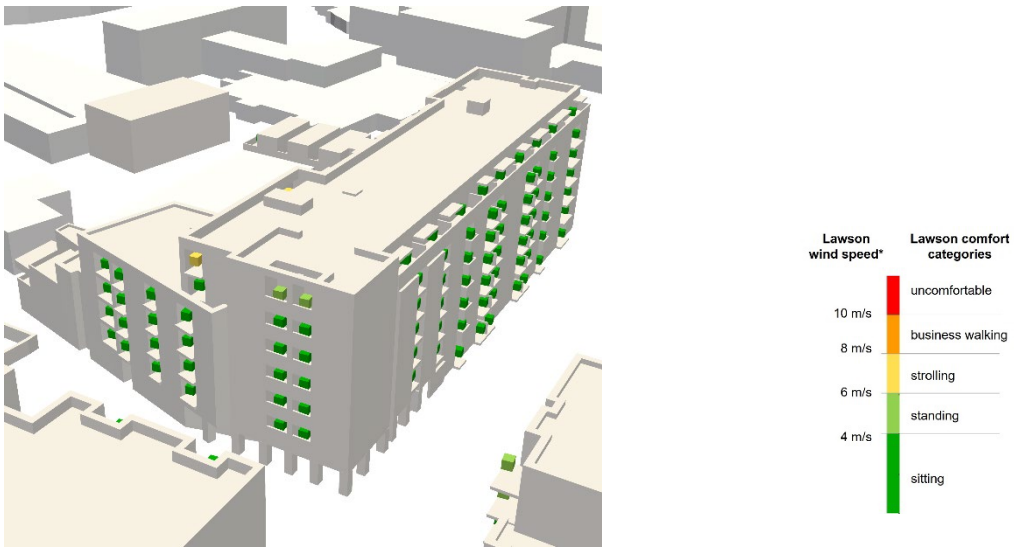


Figure 16: Lawson wind speeds at BG1 balconies of the proposed development in existing surroundings (SE view)

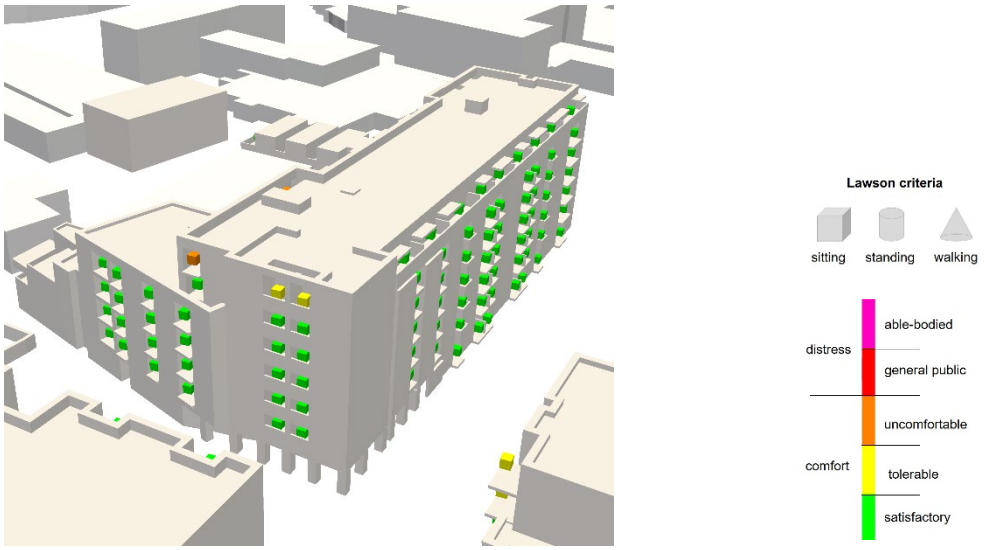


Figure 17: Lawson criteria at BG1 balconies of the proposed development in existing surroundings (SE view)

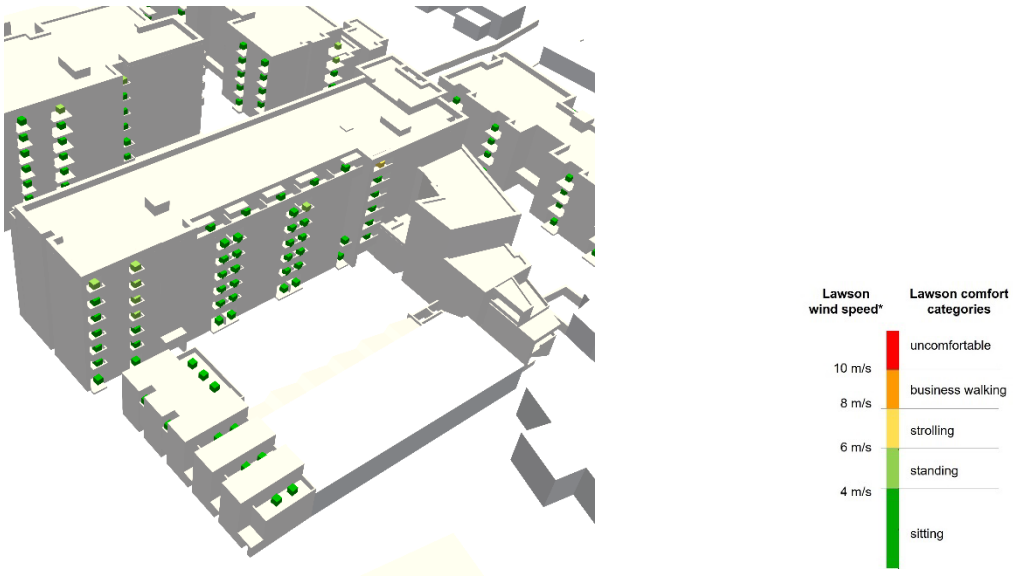


Figure 18: Lawson wind speeds at BG1 balconies of the proposed development in existing surroundings (NW view)

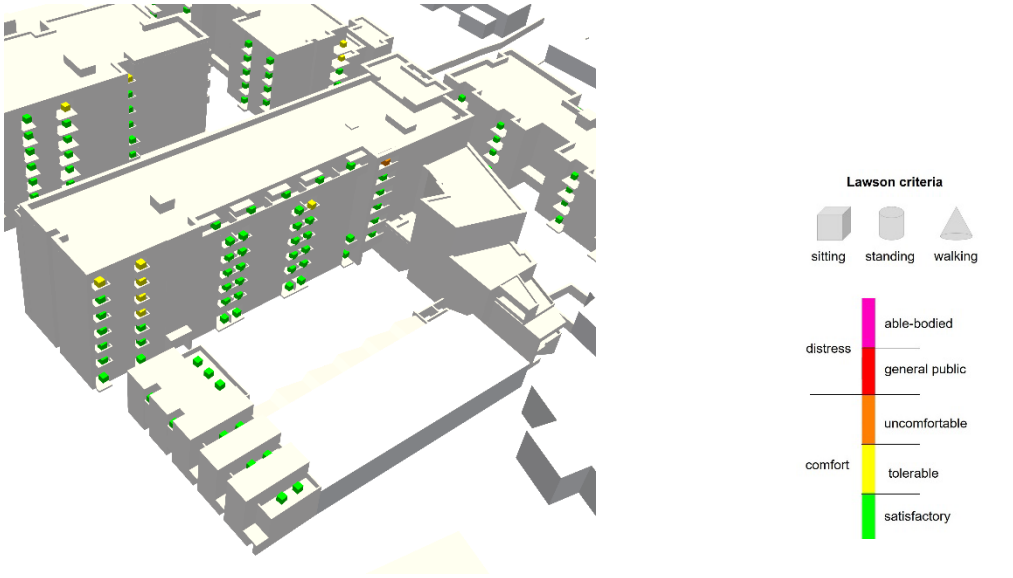


Figure 19: Lawson criteria at BG1 balconies of the proposed development in existing surroundings (NW view)

3.2.3 Terrace

BG1 has larger terraces attached to the creche, on the western side of the building. The lower-level terrace is protected by a solid balustrade and a slatted screen, and is closed off to the north. The wind conditions are estimated up to 4 m/s and suitable for an outdoor sitting space. The upper terrace also has a solid balustrade and slatted screen, and the wind speeds estimated near the corner of the terraces are up to about 6 m/s and reasonable for a sitting space.

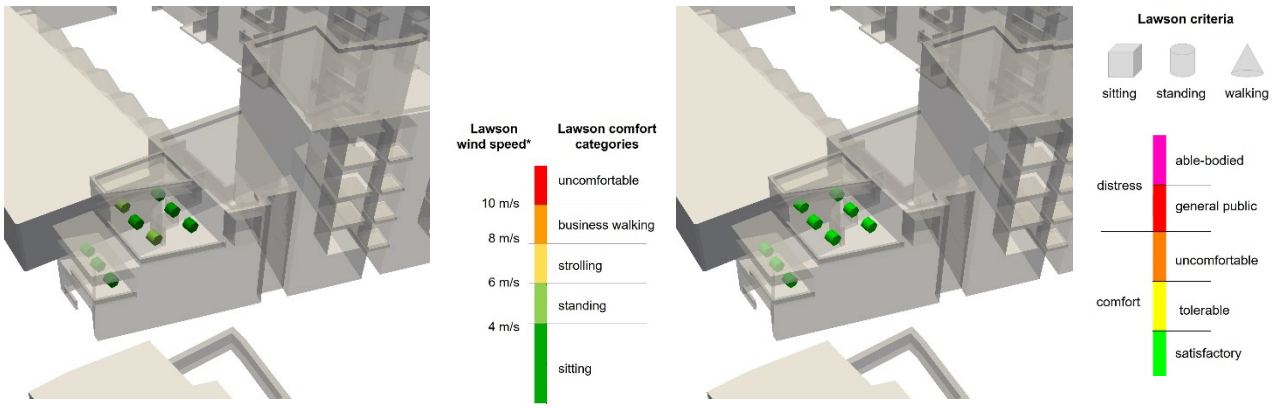


Figure 20: Lawson wind speeds and criteria at BG1 terraces of the proposed development in existing surroundings

3.3 Block BG2

3.3.1 Entrances

The wind conditions at all primary entrances of Block BG2 are estimated up to 6 m/s and considered suitable for their intended use.

Figure 21: Lawson wind speeds (left) and Lawson criteria (right) at the primary entrances of BG2

3.3.2 Elevated courtyard

BG2 features an elevated courtyard that is considered a semi-private/semi-public shared space for the building occupants. There is an expectation to use this space in good-weather conditions and for connectivity. The wind conditions on the elevated courtyard of BG2 are expected to be up to about 6 m/s and reasonable for an outdoor amenity space.

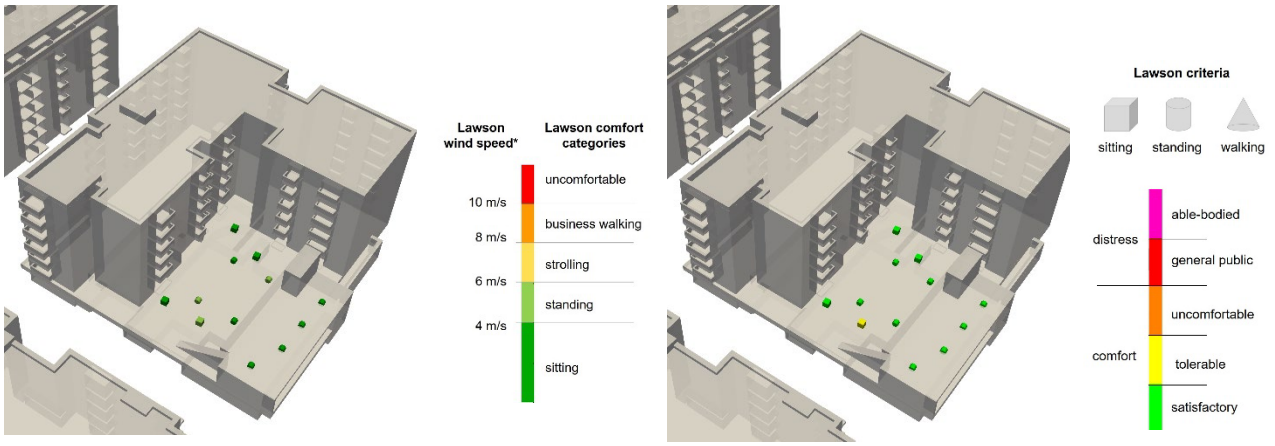


Figure 22: Lawson criteria at the elevated courtyard that is part of the BG2 block (proposed development in existing surroundings)

3.3.3 Balconies

All balconies facing the elevated courtyard in BG2 are relatively protected from the wind by their orientation and the use of solid balustrades. The wind conditions are estimated up to about 4 m/s and considered comfortable for outdoor sitting (Figure 24). Similar conditions are expected on the long east-facing balcony of the café space to the south-east of BG2, as well as on the north- and south-facing facades of the main building.

The conditions estimated on the upper floor balconies on the western façade (Figure 26) exceed 4m/s but remain at the lower end of the 'standing' range and therefore, they are reasonable for good weather use. Lower wind speeds in the 'sitting' range are estimated on all other balcony levels.

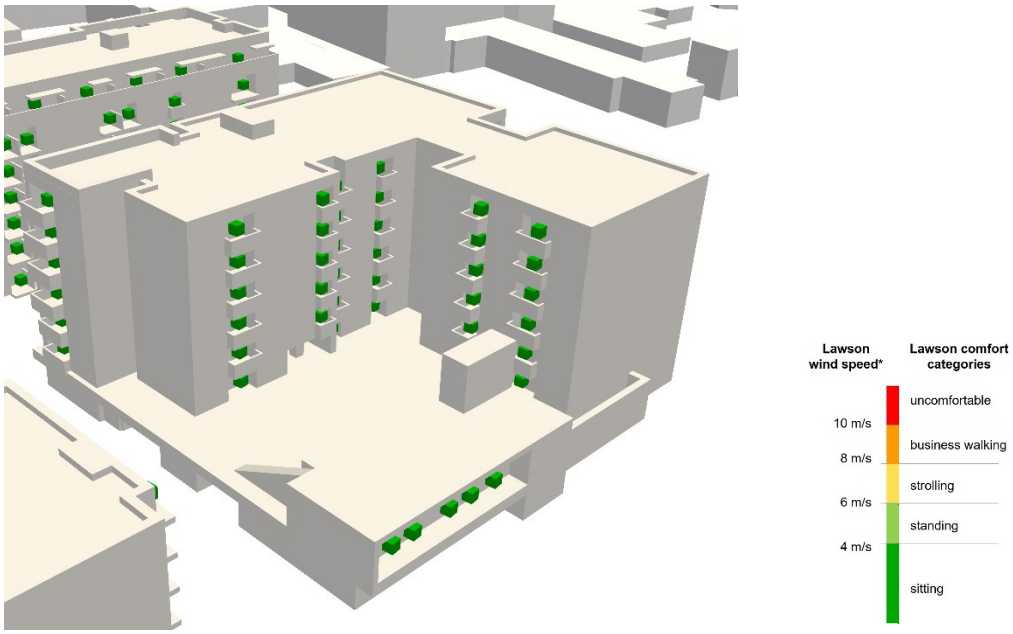


Figure 23: Lawson wind speeds at BG2 balconies of the proposed development in existing surroundings (SE view)

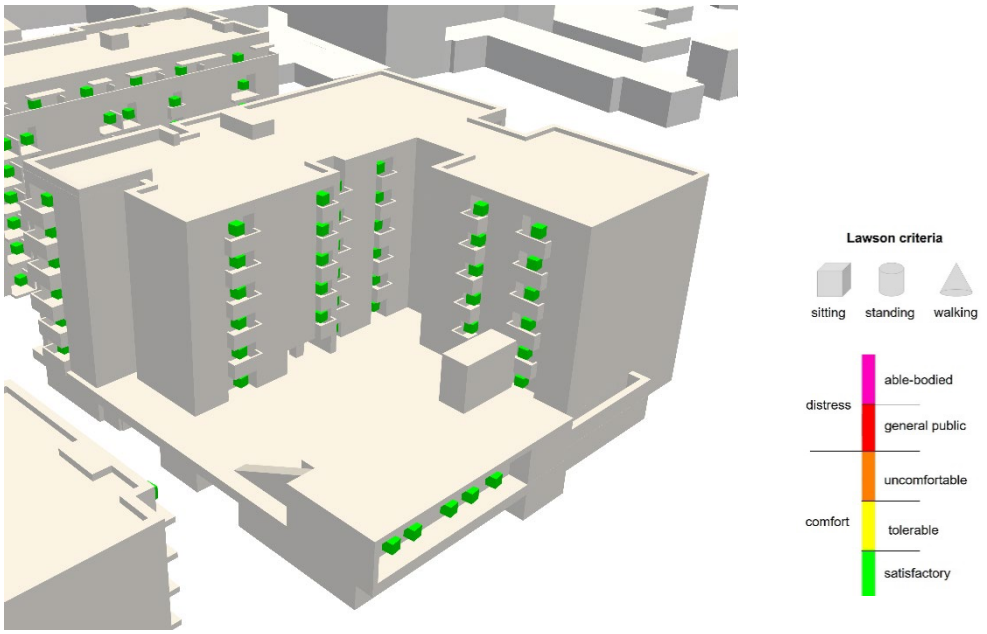


Figure 24: Lawson criteria at BG2 balconies of the proposed development in existing surroundings (SE view)

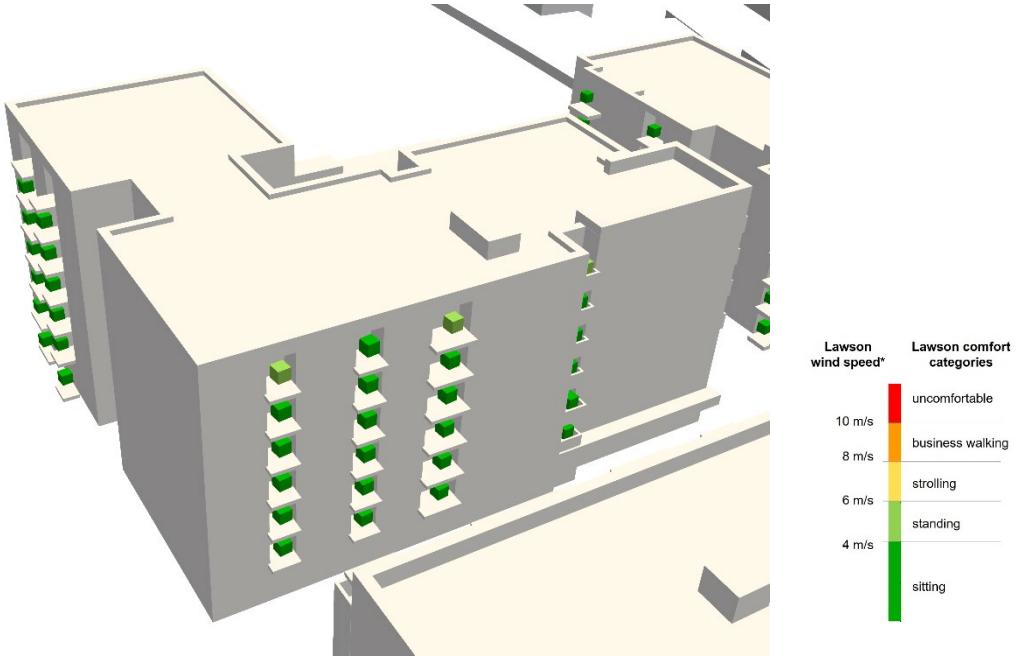


Figure 25: Lawson wind speeds at BG2 balconies of the proposed development in existing surroundings (NW view)

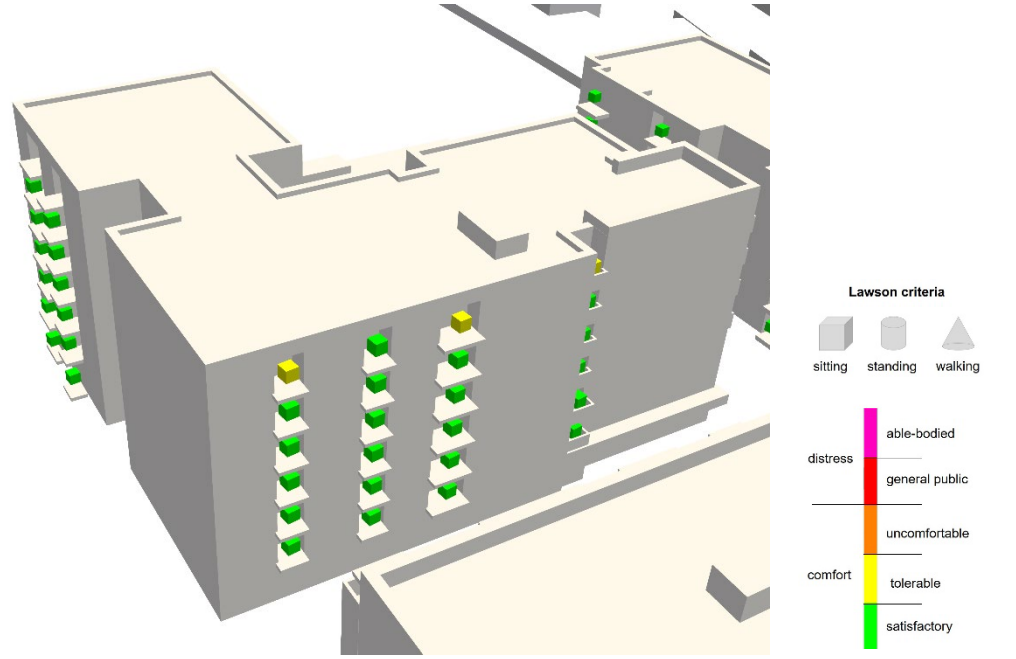


Figure 26: Lawson criteria at BG2 balconies of the proposed development in existing surroundings (NW view)

3.4 Block BG3

3.4.1 Entrances

The wind conditions at all primary entrances of Block BG3 are estimated up to 4 m/s and considered suitable for their intended use.

Figure 27: Lawson wind speeds (left) and Lawson criteria (right) at the primary entrances of BG3

3.4.2 Balconies

The south-facing balconies of Block BG3 are partially recessed and protected from the wind thanks to a solid balustrade (Figure 29). The wind speeds estimated at these balconies are up to 4 m/s, thus yielding comfortable conditions for outdoor sitting.

The north-facing and west-facing balconies (Figure 31) are more exposed to the wind because of the railing balustrades and the wind conditions estimated in the lower west-facing block exceed 5m/s placing it in the middle of the ‘standing’ range. These conditions are reasonable for good-weather use.

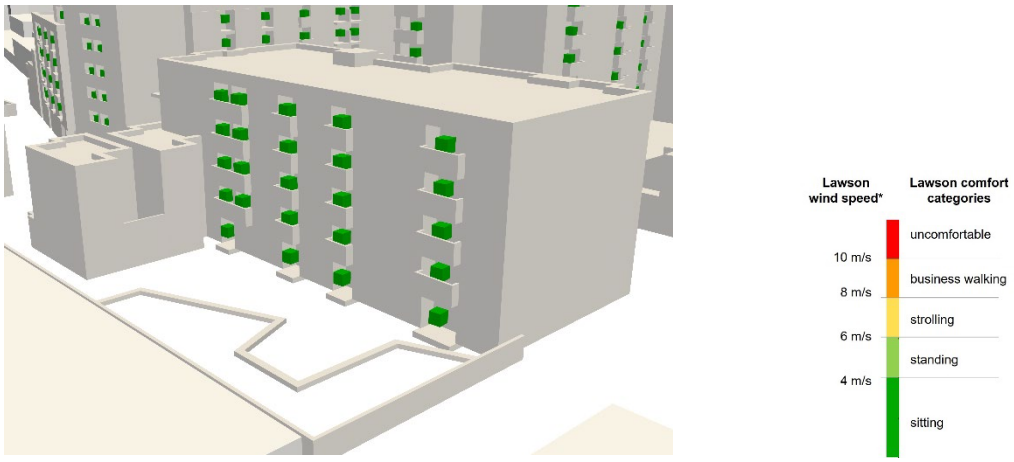


Figure 28: Lawson wind speeds at BG3 balconies of the proposed development in existing surroundings (SE view)

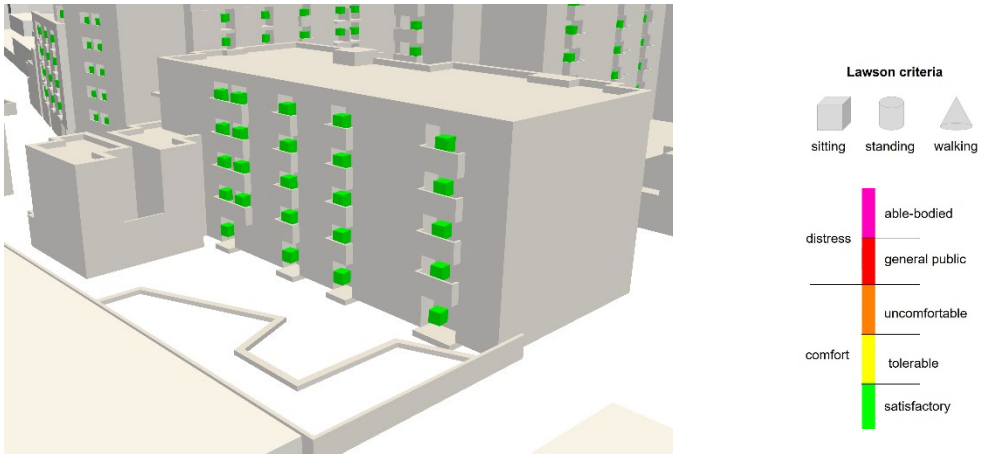


Figure 29: Lawson criteria at BG3 balconies of the proposed development in existing surroundings (SE view)

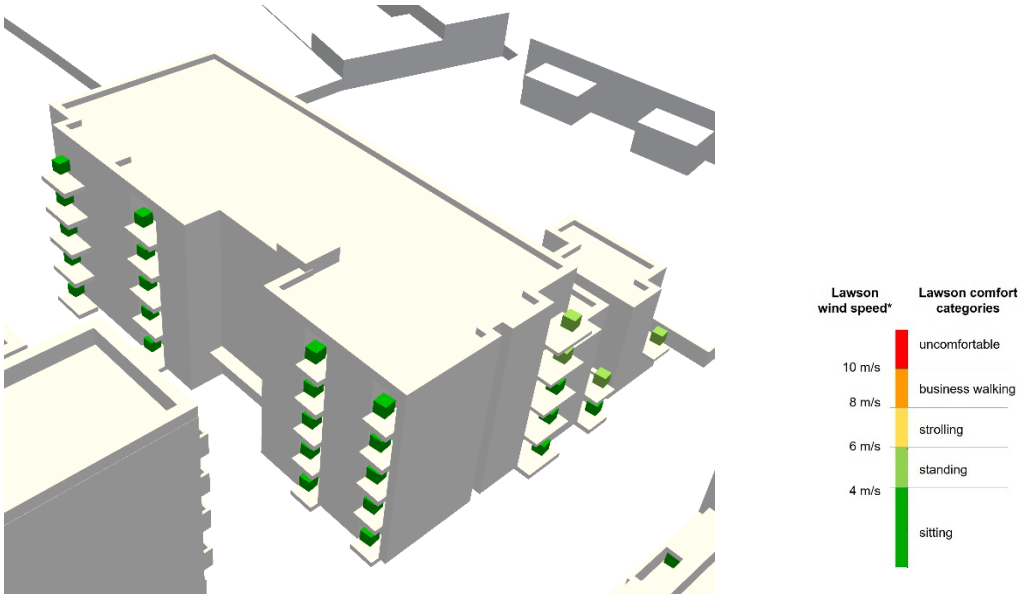


Figure 30: Lawson wind speeds at BG3 balconies of the proposed development in existing surroundings (NW view)

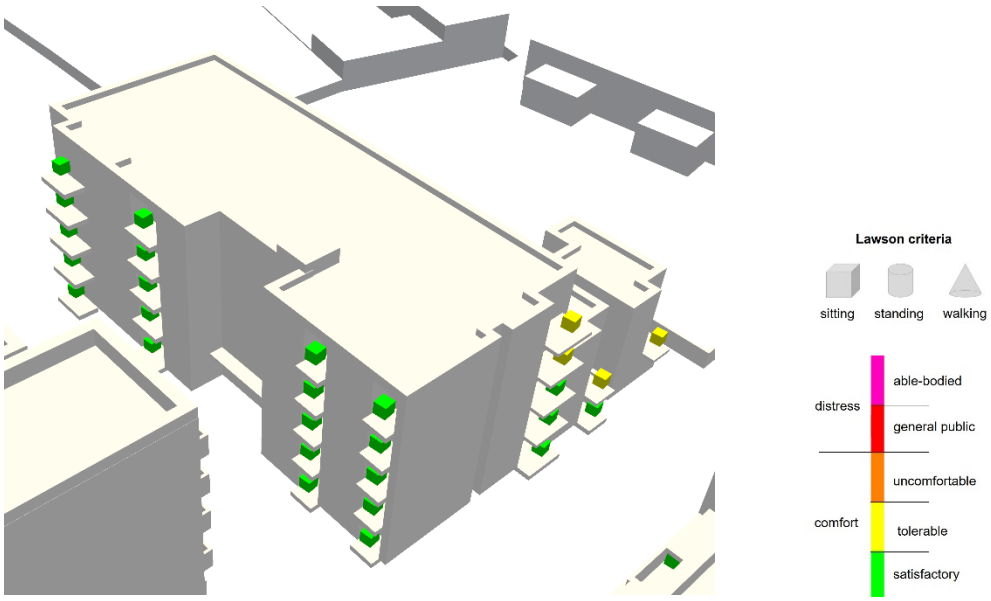


Figure 31: Lawson criteria at BG3 balconies of the proposed development in existing surroundings (NW view)

3.5 Block BG4

3.5.1 Entrances

The wind conditions at all primary entrances of Block BG4 are estimated up to 6 m/s and considered suitable for their intended use.

Figure 32: Lawson wind speeds (left) and Lawson criteria (right) at the primary entrances of BG4

3.5.2 Balconies

Block BG4 is relatively low-rise, so milder wind conditions are expected at the balconies. The estimated wind speeds are overall within the comfortable sitting range. An upper-floor west-facing balcony is expected to experience slightly stronger wind conditions, however these remain reasonable for the intended use.

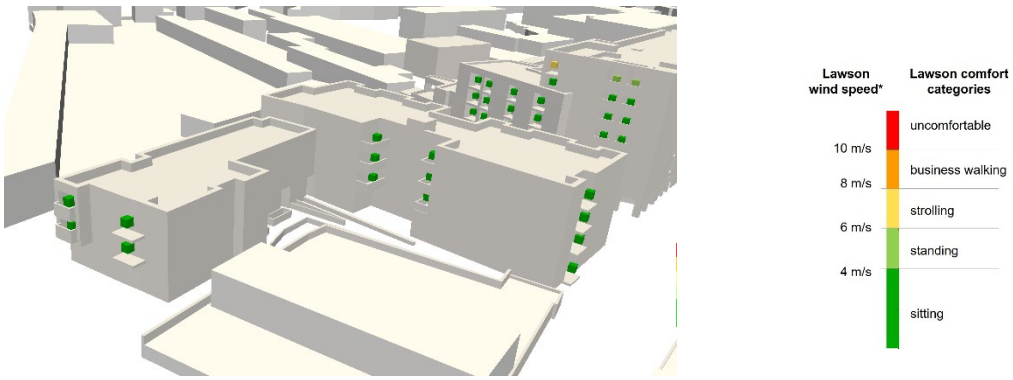


Figure 33: Lawson wind speeds at BG4 balconies of the proposed development in existing surroundings (SE view)

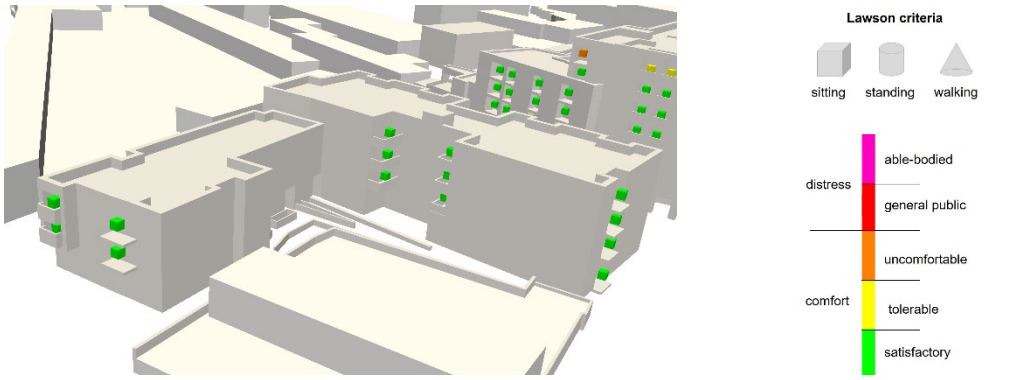


Figure 34: Lawson criteria at BG4 balconies of the proposed development in existing surroundings (SE view)

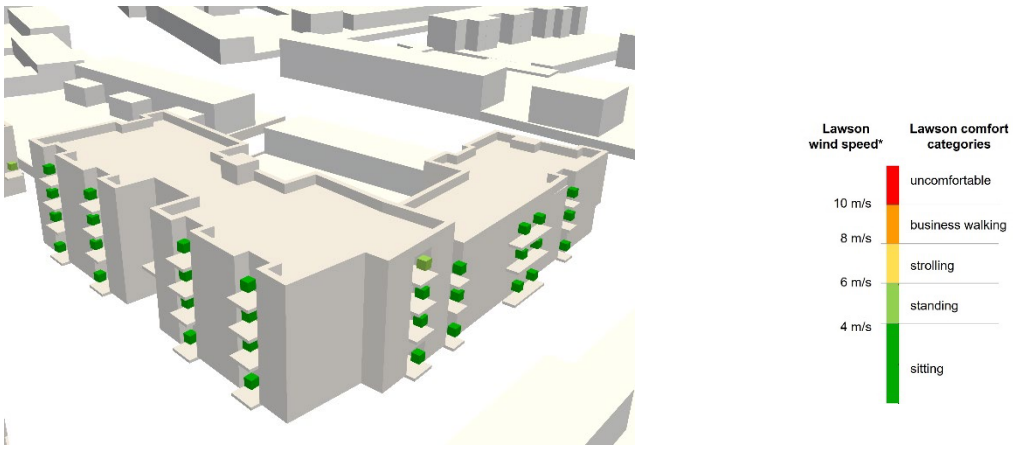


Figure 35: Lawson wind speeds at BG4 balconies of the proposed development in existing surroundings (NW view)

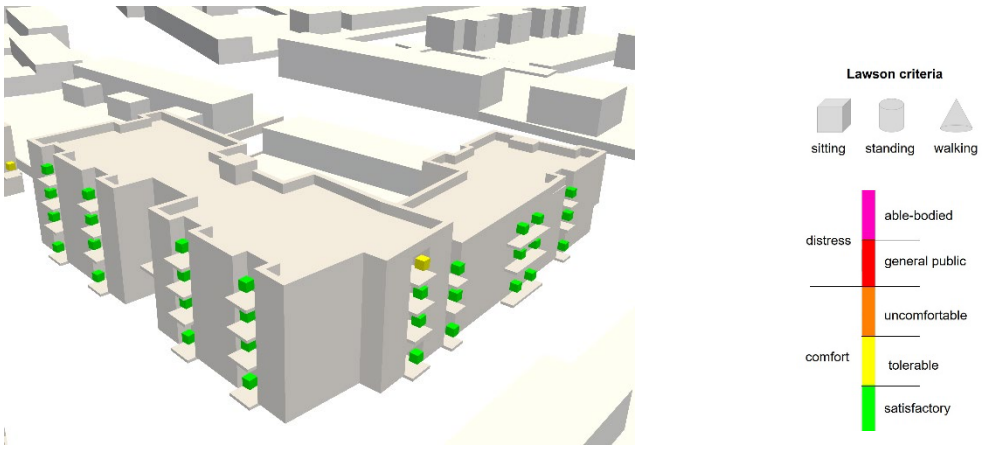


Figure 36: Lawson criteria at BG4 balconies of the proposed development in existing surroundings (NW view)

3.6 Block BG5

3.6.1 Entrances

The wind conditions at all primary entrances of Block BG5 are estimated up to 4 m/s and considered suitable for their intended use.

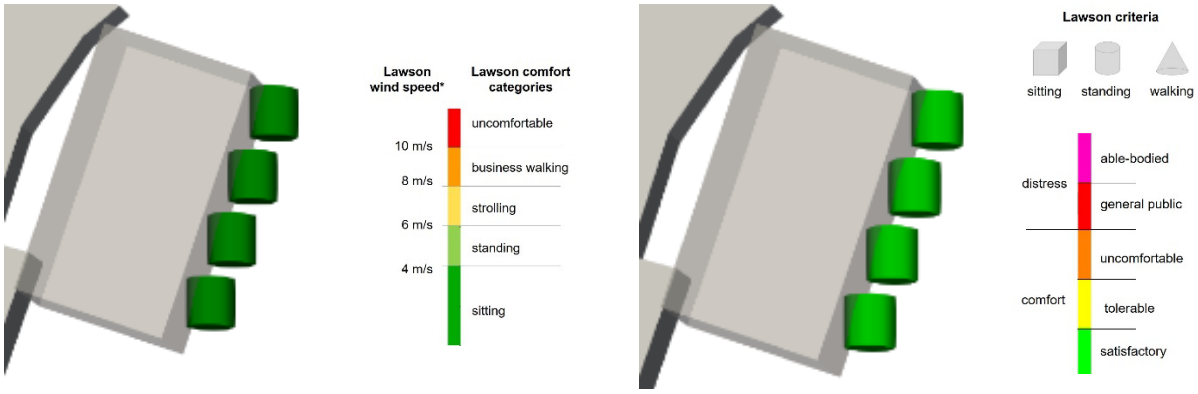


Figure 37: Lawson wind speeds (left) and Lawson criteria (right) at the primary entrances of BG5

4. Proposed Development in Existing Surroundings with Landscaping

This section considers the impact of landscaping on the wind conditions in and around the proposed development in the context of its existing and permitted surrounding buildings. Landscaping comprises of the elements shown in Figure 38.

Figure 38: Top view of the proposed development with landscaping and the existing surroundings as represented in the CFD model

4.1 Overview

The proposed landscaping has a beneficial impact on the wind conditions in and around the proposed development. Figure 39 and Figure 41 illustrate the Lawson wind speeds at key areas along the thoroughfares and on the sitting areas at the publicly accessible spaces around the proposed development. Figure 40 and Figure 42 show that the wind speeds estimated at most of these locations are considered suitable for pedestrian access and causal sitting use.

The landscaping has a minimal impact on the wind conditions along the short section of walking connecting the southern and northern area of the site as it will remain a windy spot prone to distress for a few hours (i.e. 3 hours) each year. The landscaping is beneficial in reducing the extent of the windiness.

Figure 39. Lawson wind speeds at key locations along the thoroughfares of the proposed development in existing surroundings with landscaping

Figure 40: Lawson criteria at key locations along the thoroughfares of the proposed development in existing surroundings with landscaping

Figure 41. Lawson wind speeds at key locations of the public open spaces within the proposed development in existing surroundings with landscaping

Figure 42: Lawson criteria at key locations of the public open spaces within the proposed development in existing surroundings with landscaping

5. Proposed Development in Future Surroundings with Landscaping

This section considers the impact of the cumulative (future) surroundings on the wind conditions in and around the proposed development. The cumulative surroundings include the DCC development and the Player Wills Phase 2 development as indicated in Figure 43.

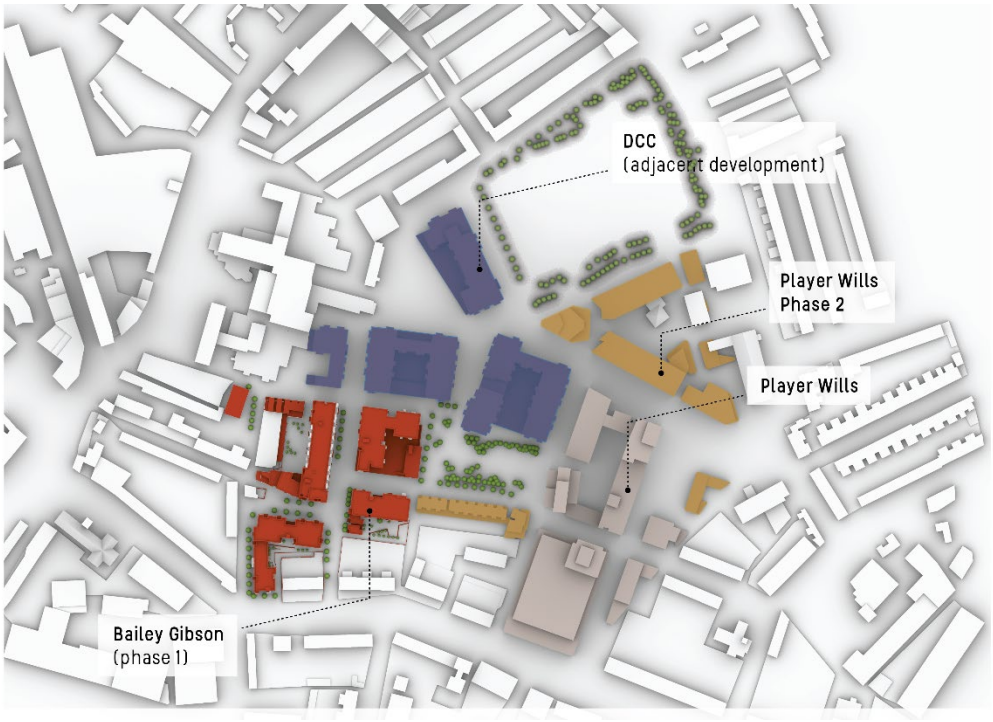


Figure 43. Top view of the proposed development with landscaping and the cumulative (future) surroundings as represented in the CFD model

5.1 Overview

Figure 44 and Figure 46 provides an overview of the Lawson wind speeds at key areas along the thoroughfares and at the sitting areas at the publicly accessible spaces across the site. The future developments are located on the north and east side of the proposed development, which is downstream the prevailing wind directions. These developments have a minor influence on the wind conditions on the area surrounding the mixed-used buildings to the south of the site. The impact of the future developments is more evident in the passage connecting this area to the multi-sport playing pitch, where the additional massing provides more shelter from the wind. Figure 45 and Figure 47 show that the wind conditions estimated at most locations on the throughfares and sitting areas are considered suitable for pedestrian access and casual sitting use.

Figure 44: Overview of the Lawson wind speeds at key locations along the thoroughfares around the site in cumulative (future) surroundings with landscaping

Figure 45: Lawson criteria at key locations along the thoroughfares of the proposed development in future surroundings with landscaping

Figure 46. Lawson wind speeds at key locations of the public open spaces within the proposed development in future surroundings with landscaping

Figure 47: Lawson criteria at key locations of the public open spaces within the proposed development in future surroundings with landscaping

6. Conclusions

The conclusions of the Bailey Gibson wind microclimate study are as follows:

- Overall, the proposed development is expected to provide a suitable environment for pedestrians and occupants to carry out a wide variety of 'sitting', 'standing' and 'strolling' activities.
- Wind mitigation strategies have been adopted throughout the design to reduce the windiness across the site and to keep the wind conditions within acceptable limits. The building massing shelters the courtyards and the shared open spaces in the residential areas from the prevailing winds. Overall, the entrances are in sheltered locations, and some have additional recesses. Most balconies are provided with solid balustrades, and canopies and side screens are part of the design of the top-floor balconies in BG1.
- The wind conditions estimated at most of the key locations along the thoroughfares within and adjacent to the proposed development are considered suitable for their intended use. The wind conditions along a section of the walking path connecting Players Park to the multi-sport playing pitch are affected by downdraft off the tallest tower of the Player Wills development. These wind conditions are in marginal exceedance of the distress criteria for up to 3 hours per year. This would be considered a slight effect.
- The wind conditions estimated at the primary entrances of the proposed development meet the 'standing' limit and are suitable for the intended use.
- The wind conditions estimated at most of the proposed sitting locations in the public open spaces are within the 'sitting' to 'standing' range and are expected to be 'comfortable' for standing and short-term seating, like bench seating use.
- The impact of the possible future development (see Section 5) on the wind conditions around the proposed development is expected to be not significant.
- The possible future development may have a beneficial impact in the passage connecting Players Park to the multi-sport playing pitch, where the additional massing provides more shelter from the prevailing winds.

7. References

[1] Lawson, TV, 2001, 'Building Aerodynamics', Imperial College Press, London.