Government Property Agency

AtkinsRéalis



MANCHESTER DIGITAL CAMPUS

Environmental Statement
Volume 2 - Chapter 20: Wind and Micro-climate

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Executive Summary

Wind and microclimate are essential factors that influence pedestrian comfort, safety, and the overall useability of a development. Proper assessment ensures that wind patterns do not create uncomfortable or hazardous conditions, such as strong ground-level winds or excessive turbulence.

The Wind and Microclimate chapter evaluates the impact of the Manchester Digital Campus on the surrounding area's wind and microclimate. A Pedestrian Wind Comfort (PWC) analysis was conducted to determine the comfort and safety levels for users due to the Proposed Development. This analysis used advanced computer simulations to create a 3D model of the area, considering both the existing Site and the Proposed Development with planned landscaping and wind mitigation measures for the operational phase of the Proposed Development.

Two scenarios were modelled:

- The existing site within the current surroundings.
- The proposed development within the existing surroundings, including committed developments and mitigation measures.

Wind conditions were assessed using the Lawson Comfort Criteria and the NEN 8100 safety criteria, which are industry standards for evaluating pedestrian comfort and safety in urban environments. The results showed that both scenarios meet these criteria. While there are slight increases in wind speed due to the Proposed Development, all areas remain suitable for their intended uses, including building entrances, seating areas, and recreational spaces.

Mitigation measures include the use of soft landscaping across the site to reduce wind impacts. With these measures in place, no significant residual adverse effects on wind and microclimate are expected.

Overall, the Manchester Digital Campus meets industry standards for pedestrian comfort and safety. The slight increases in wind speed are effectively mitigated by landscaping, ensuring that all areas remain comfortable and safe for use. The Proposed Development will not have adverse impacts on the surrounding uses, including the Co-op Academy New Islington Primary School, New Islington Marina, Canal Plaza and Cotton Field Park. The development supports a sustainable and resilient community by maintaining the quality of the urban environment.

20. Wind Microclimate

20.1. Introduction

20.1.1. This chapter of the ES assesses the likely effects of the Proposed Development with respect to wind microclimate. It outlines the assessment methodology, describes the existing baseline conditions, identifies potential impacts and provides an assessment of effects. The chapter also details the mitigation measures necessary to prevent, reduce, or offset any significant adverse effects, and discusses the likely residual effects after these measures have been implemented.

20.1.2. This chapter reports on two different types of cumulative effects: intra-project cumulative effects, which are the combined effects of individual topic impacts on a particular sensitive receptor; and inter-project cumulative effects, which consider the way in which the Proposed Development may give rise to impacts in combination with other developments the study area, termed RFFPs. The reporting of cumulative effects within the scope of the topic are then used to inform the overall assessment of cross-topic cumulative effects, which is reported in ES (Volume 2) Chapter 22: Cumulative Effects.

20.1.3. This chapter is supported by a technical appendix contained within ES Volume 4:

- ES (Volume 4) Appendix 20.1 – Wind and Microclimate Assessment Report.

20.2. Competent expert evidence

20.2.1. This wind microclimate assessment has been undertaken and reviewed by:

- A building physics consultant who has over 3 years' experience in Pedestrian Wind Comfort (PWC) assessment and is a Chartered member of the Chartered Institution of Building Services (CIBSE); and
- A building physics associate director who has over 15 years' experience in wind assessment and is a Chartered member of CIBSE.

20.2.2. The above listed individuals have used their knowledge and professional judgement to undertake the assessment.

20.3. Relevant legislation and guidance

20.3.1. Table 20-1 below summaries the legislation and regulations applicable to this wind microclimate assessment.

Table 20-1 - Policies for wind microclimate assessment

Legislation / regulation	Summary of requirements
National	
National Planning Policy Framework (NPPF)[1] December 2023	The NPPF does not specifically reference wind or microclimate. However, the NPPF does emphasise the benefits of a high-quality built environment.
Local	
Manchester's Core Strategy 2012 – 2027[2];	Any work will follow the relevant policies for Manchester City Council (MCC) as stated in Policy EN 2 (part of the Manchester's Local Development Framework Core Strategy Development Plan Document) to highlight any specific wind microclimate requirement additional to the regional and national planning policies.
Places for Everyone Joint Development Plan[3]	The plan includes Policy JP-P1: Sustainable Places aiming to allow all development to be comfortable and living, with indoor and outdoor environments addressing microclimates such as sunlight, indoor air quality, overheating, shade, wind and shelter.

20.3.2. Table 20-2 below summaries the technical standards and guidance applicable to the wind microclimate assessment.

Table 20-2 - Technical standard and guidance for wind microclimate assessment

Technical standards / guidance	Summary of requirements
Industry standard criteria (Lawson Criteria)	The industry standard criteria for wind microclimate assessments are commonly referred to as the Lawson criteria. The Lawson criteria describe the impact of environmental wind on pedestrian spaces and the subsequent suitability of these spaces for planned usage. The de-facto standard for wind microclimate assessments in the United Kingdom is the Lawson criteria - predominantly the London Docklands Development Corporation (LDDC) variant.
	The LDDC variant applies a single percentage probability of exceedance of a range of wind speeds and associates each wind speed to a common pedestrian use such as sitting, standing, and walking for comfort, with higher wind speed thresholds for the assessment of safety. Any non-adherence to these criteria requires a reconsideration of design.

[1] National Planning Policy Framework - Guidance - GOV.UK (www.gov.uk)

[2] Core Strategy 2012-2027 | Core Strategy 2012-2027 | Manchester City Council

[3] Places for Everyone | Places for Everyone | Manchester City Council

20.4. Assessment methodology

Study Area

20.4.1. The Proposed Development comprises of two office buildings (referred to as the North and South buildings), with ground floor commercial offer to Great Ancoats Street, alongside the creation of new areas of public realm and landscaping. The North Building will consist of ground plus seven floors and the South Building will consist of ground plus six floors. Both buildings will include an enclosed and exposed rooftop plant.

20.4.2. The microclimate of any development refers to the unique climate conditions of a small-scale area. Weather variables in a microclimate, such as wind, can differ significantly from the prevailing conditions of the broader area. For this assessment, the study area comprises the Site and extends to a 240 m radius from its centre, as shown in Figure 20-5. A study area of 240 m captures the localised wind effects associated with the Proposed Development and aligns with wind microclimate guidelines (Lawson Comfort Criteria) which suggest study areas in the range of 200-300 metres for developments in urban environments.

20.4.3. The North and South buildings are illustrated by the massing model in Figure 20-1. The North and South buildings have a route cut between the two from east to west known as The Boulevard.

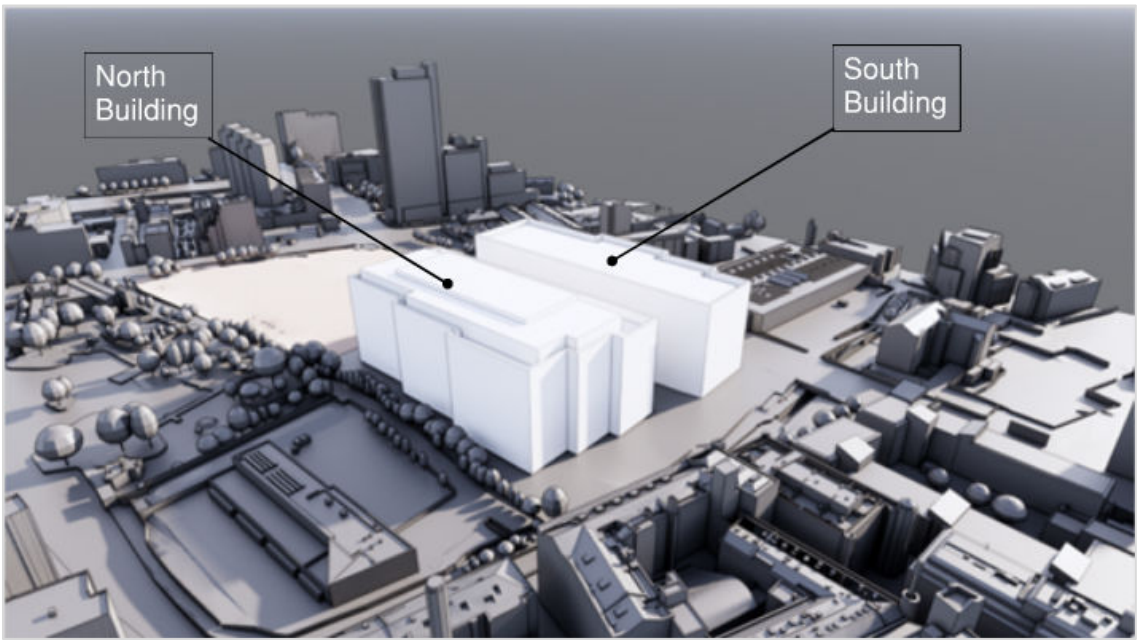


Figure 20-1: View of massing model of the North and South Buildings

20.4.4. The wind effect results within a 240 m radius to the Site were presented, to optimise the simulation hours to produce and project specified results within the Proposed Development. A 240 m distance was considered sufficient and appropriate to capture all the wind effects on the Site and the surrounding area.

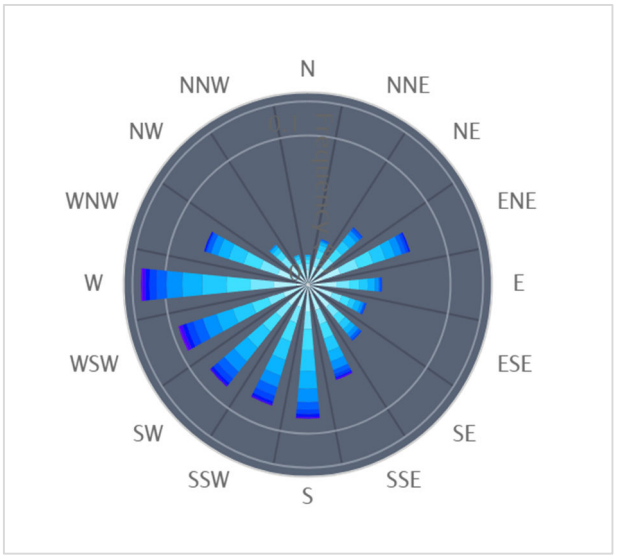
Weather

20.4.5. Wind conditions for the Site have been determined by accessing Meteoblue weather data from within the Simscale platform. This dataset was considered the most accurate weather information available for

the Site. For this project, the Meteoblue weather data relies on nearby weather stations, with Manchester Airport being one of the primary sources.

20.4.6. The Meteoblue climate data, derived from 30 years of hourly weather model simulations, provide comprehensive insights into typical climate patterns and expected conditions, including temperature, precipitation, sunshine and wind for any location on Earth. The simulated weather data have a spatial resolution of approximately 30 km and may not reproduce all local weather effects, such as thunderstorms, local winds, or tornadoes, which are out of the scope of this current assessment.

20.4.7. The baseline wind microclimate in the area is driven by prevailing south-westerly winds. This is typical of the Manchester wind climate. The wind rose graphical charts indicate that the prevailing wind direction for the Proposed Development is Westerly. The wind rose and associated wind directions and occurrence are shown in Figure 20-2.



Wind Direction	Angle	% Occurrence
N	0	2%
NNE	22.5	3%
NE	45	5%
ENE	67.5	8%
E	90	5%
ESE	112.5	4%
SE	135	5%
SSE	157.5	7%
S	180	9%
SSW	202.5	9%
SW	225	9%
WSW	247.5	10%
W	**270**	**12%**
WNW	292.5	8%
NW	315	4%
NNW	337.5	2%

Figure 20-2 – Project Site Wind Rose

20.4.8. The weather data set used for this assessment included 16 different wind directions. This approach is typically used in developments of this size and complexity. Simulations are expected to provide minimal or no variation in the results if performed using additional wind directions. Seasonal wind directions are shown in Figure 20-3. The data indicates that the Site has the strongest wind from the west side.

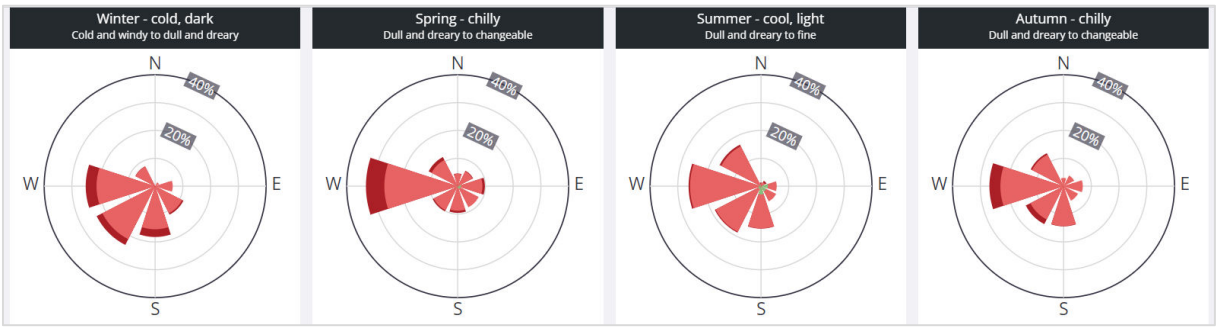


Figure 20-3– Seasonal Wind Rose

Methodology

20.4.9. Wind can create both positive and negative comfort conditions, enhancing pedestrian comfort during high temperatures or decreasing pedestrian comfort if too strong. The level of comfort varies based on the type of activity being performed. For instance, higher wind speeds are generally tolerated for active spaces like walkways, while lower wind speeds are comfortable for spaces allocated for sitting and resting.

20.4.10. A Pedestrian Wind Comfort (PWC) analysis has been undertaken to identify the level of comfort and discomfort to users and receptors as a result of the introduction of the Proposed Development into the study area.

Computational Fluid Dynamics (CFD)

20.4.11. The wind analysis presented in this report has been carried out using CFD simulations utilising the Simscale platform.

20.4.12. Transient simulations have been conducted using the Lattice Boltzmann Method (LBM) and the k-ω Sheer Stress Transport (SST) turbulence model. In Simscale's PWC analysis, the LBM and SST turbulence model work together to simulate wind flow around buildings and urban areas, predicting pedestrian wind comfort. The LBM models transient airflow, accurately capturing how wind patterns evolve over time around complex structures, while the k-ω SST turbulence model approximates turbulent effects, particularly near walls and in open spaces. This combination allows Simscale to assess wind speeds and turbulence intensity, helping planners design environments that are safer and more comfortable for pedestrians by identifying areas with favourable or potentially uncomfortable wind conditions.

20.4.13. In particular, the Lawson Criteria recommend that wind conditions for pedestrian comfort (e.g., sitting, standing, walking) should remain below the threshold for their respective activity at least 95% of the time, covering all hours and seasons. For safety assessments, the tolerance is even more stringent, with allowances for exceedance at only 0.022% of the time. This translates to observing wind conditions and comfort levels across multiple months or years of meteorological data, often spanning at least 10 years, to ensure that the comfort and safety guidelines are statistically robust over seasonal variations.

20.4.14. Additional information on the CFD simulation is provided in ES (Volume 4) Appendix 20.1

Geometry

20.4.15. A 3-Dimensional (3D) model for the Proposed Development has been used as provided by the architects and landscape architects, cleaned up on design software Rhino and imported in the Simscale platform for the analysis as shown in Figure 20-4.

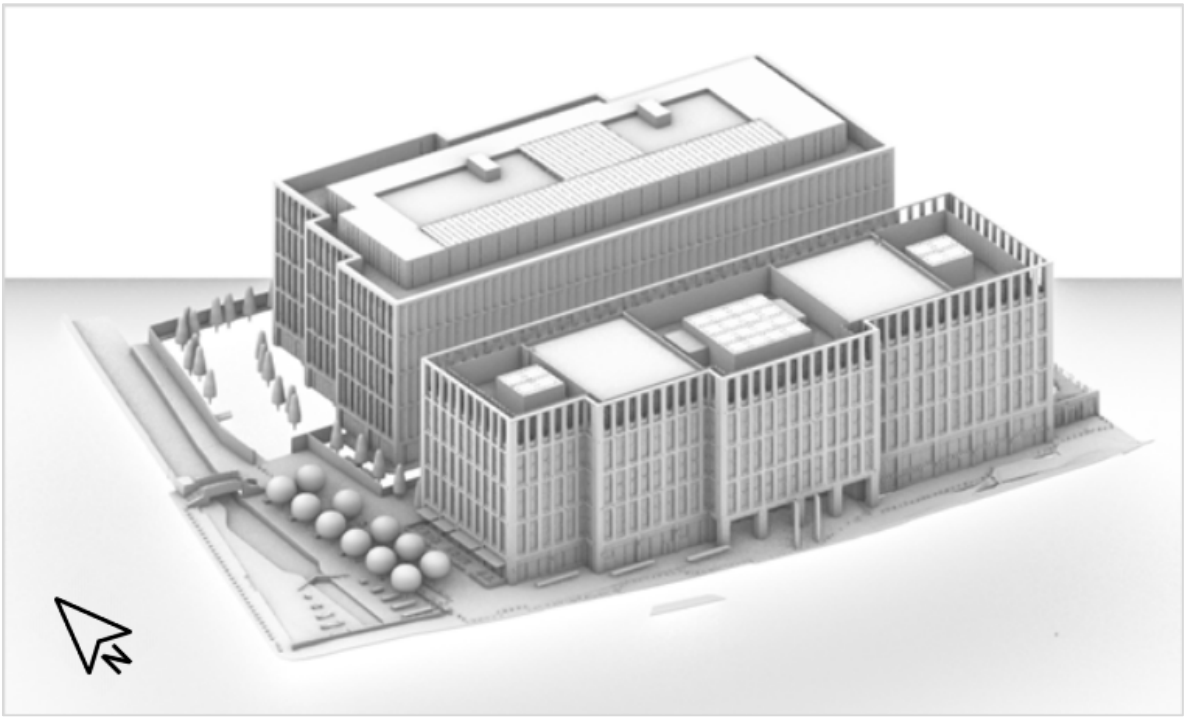


Figure 20-4– 3D view of Rhino model of the North and South buildings[4]

20.4.16. The geometry of the Proposed Development includes the massing of building as well as the façade details to analyse the effects of wind on and around the Site as much as possible. Landscaping elements (*MN00-ATK-ZZ-ZZ-M3-L-000001*) have also been included to understand how this could influence the wind and microclimate.

20.4.17. The modelled scenario considers the operational phase of the Proposed Development. In order to best reflect the townscape at that time, the model has included data from publicly accessibility plans relating to those projects within the RFFP shortlist that are expected to be constructed in the same timeframe as the Proposed Development which can be seen in Figure 20-5.[5] These developments have been considered as they will have become receptors during the Proposed Developments operation and will be spaces/uses in the townscape that will affect the wind and microclimate. The list of these developments can be seen in Section 20.10.

[4] The landscape design used in the PWC has been updated since the methodology and associated modelling has been undertaken, this is addressed in the limitations and assumptions subsection within the Chapter.

[5] The RFFP shortlist in ES (Volume 2) Chapter 22: Cumulative Effects Assessment has assumptions about the progression of development of each of those projects relative to the Proposed Development

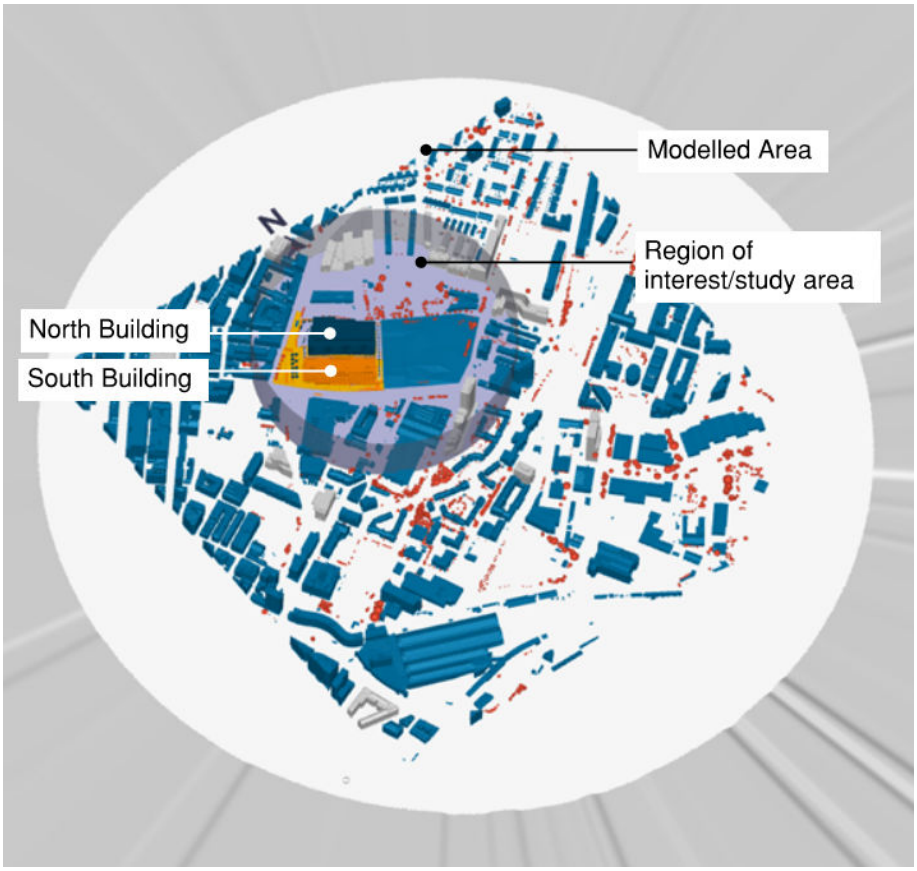


Figure 20-5– 3D view of Simscale Model inclusion of surrounding cumulative developments

20.4.18. As per Figure 20-5, the area inside the white circle (radius over 500m) represents the modelled area. This encompasses the entire area where the simulation has been conducted, including all the surrounding buildings and structures, to understand how they affect the environment around them.

20.4.19. The grey/purple highlighted circle is the region of interest area (ROI) also known as the study area, and the simulation has provided more detailed results within this area. The simulation results will be presented within the study area (known as ROI), which is 240-meter radius from the Proposed Development. As previously mentioned, a 240-meter radius is considered best practice for presenting results and is the area recommended by Simscale for conducting wind modelling calculations

Scenarios Tested

20.4.20. The 3D model was constructed based on two scenarios:

- Scenario 1: Existing Site within the context of the baseline surrounding conditions.
- Scenario 2: Proposed Development with soft landscaping within the context of existing surrounding conditions plus committed cumulative planned developments.

20.4.21. As part of this chapter methodology, two scenarios were undertaken compared with three scenarios previously outlined within the Scoping Report: ES (Volume 4) Appendix 4.1. The three scenarios within the Scoping Report outlined:

- Scenario 1: Baseline – Existing Site in Existing Surrounding Context
- Scenario 2: Proposed Development in Existing Surrounding Context
- Scenario 3: Proposed Development in Cumulative Surrounding Context

20.4.22. In order to better reflect the realistic future scenario, the previously outlined Scenario 2 was removed as Scenario 3 (now Scenario 2 within this assessment) captures the MDC buildings, proposed Landscape design, and proposed cumulative developments, providing the most significant impacts (worst case). The same CFD approach was utilised as laid out in the Scoping Report and Opinion response.

20.4.23. Therefore, it was assessed that scenarios “Baseline” and “Proposed” (as outlined in this chapter) were sufficient to provide detailed analysis on the information provided, adequately capturing the environmental impacts and provide a sufficient basis for proposing mitigation measures.

Assessment criteria

20.4.24. Wind comfort and the criterion used to evaluate this perception, is based upon numerical concepts to capture how people feel in different wind conditions at varying activity levels.

20.4.25. For the purposes of this assessment, wind conditions have been evaluated against the industry standard Lawson Comfort Criteria (LCC), using the Lawson LDDC variant which is set out below. These criteria are a series of comfort categories that quantify the worst wind conditions that most pedestrians will consider acceptable in performing specific activities. Wind speeds are measured at 1.5 m above ground level.

20.4.26. The LCC set threshold wind speeds, and then dictate the probability of wind speeds exceeding that threshold, based on a 5%-time exceedance of the threshold wind speeds, that relate to tolerable wind conditions for categorised types of pedestrian activity.

20.4.27. In practice, this 5% threshold translates to a tolerance for short-lived, higher wind speeds that are expected to occur only occasionally throughout the year. This approach helps planners and engineers assess whether urban designs provide a generally comfortable and safe environment for pedestrian activities across varying conditions.

20.4.28. The Lawson LDDC Criteria are set out in Table 20-3 below.

Table 20-3: Lawson LDDC Wind Comfort Criteria

Category	Wind speed	Fulfilment value	Activity
A	>2 m/s	<5%	Outdoor Dining
B	>4 m/s	<5%	Pedestrian Sitting
C	>6 m/s	<5%	Pedestrian Standing
D	>8 m/s	<5%	Pedestrian Walking
E	>10 m/s	<5%	Business Walking
U	>10 m/s	>5%	Uncomfortable

20.4.29. The list below provides guidance on the categories, different activities and associated acceptable wind conditions:

- A: With wind speeds greater than 2.0 m/s and occurring less than 5 % of the time, the condition is suitable for Outdoor Dining.
- B: With wind speeds greater than 4.0 m/s and occurring less than 5 % of the time, the condition is suitable for Pedestrian Sitting.
- C: With wind speeds greater than 6.0 m/s and occurring less than 5 % of the time, the condition is suitable for Pedestrian Standing.
- D: With wind speeds greater than 8.0 m/s and occurring less than 5 % of the time, the condition is suitable for Pedestrian Walking.
- E: With wind speeds greater than 10.0 m/s and occurring less than 5 % of the time, the condition is suitable for Business Walking (a faster, more purposeful walk).
- U: With wind speeds greater than 10.0 m/s and occurring more than 5 % of the time, the condition is considered Uncomfortable for any outdoor activity.

20.4.30. The Lawson LDDC method specifies a limit of 0.025%, using wind speeds of 20m/s for the “General Public”, and 15m/s for a “Frail Person or Cyclist”.

20.4.31. The safety of the study area has also been assessed against the Dutch wind nuisance standard (NEN 8100) safety criteria. The NEN 8100 safety criteria is a set of guidelines developed in the Netherlands to ensure safety and comfort in relation to wind conditions around buildings. It is particularly focused on pedestrian safety in urban environments and broken down into categories as shown in Table 20-4.

20.4.32. The NEN 8100 criteria specify acceptable wind speeds for outdoor areas, based on the comfort and safety of pedestrians and cyclists. High wind speeds can make cycling uncomfortable or even dangerous, especially in open or exposed areas.

20.4.33. In the NEN8100 safety criteria, the Safety Criterion (Danger) states that for elderly or infirm pedestrians, the hourly mean wind speed should exceed 15 m/s for no more than 0.025 % of the year.

Table 20-4: NEN 8100 Safety Criteria

	Category	Wind speed	Fulfilment value	Activity
	A	15 m/s	<0.05%	No risk
	B	15 m/s	<0.30%	Limited Risk
	C	15 m/s	>=0.30%	Dangerous

20.4.34. The list below provides a guidance on the dangers caused and associated acceptable wind conditions relating to different activities:

- A: These areas are extremely safe as the occurrence of 15 m/s wind speeds is very rare (less than 0.05 % of the time). Outdoor activities in these areas do not pose any risk.
- B: These zones have a slightly higher occurrence of 15 m/s wind speeds, but still relatively infrequent (less than 0.30 % of the time). Outdoor activities here may pose some limited risk.
- C: These areas frequently experience 15 m/s wind speeds (0.30 % or more of the time), making them dangerous for outdoor activities. Precautions are necessary when planning activities in these zones.

Significance Criteria

20.4.35. Pedestrians within the site and surrounding areas are considered and defined as receptors. Future users of the Proposed Development are also considered receptors for operational effects. All receptors are equally sensitive to the wind microclimate. An unacceptable microclimate occurs if safety criteria are exceeded, or comfort criteria are not met for the existing or planned pedestrian use. All receptors are highly sensitive to local wind conditions and are given equal importance.

20.4.36. The following are the significance criteria used to assess likely wind conditions due to the Proposed Development:

- **Major Beneficial:** Any effect that improves pedestrian safety, transforming conditions from unsafe to safe. This is considered significant for the assessment.
- **Moderate Beneficial**: Any effect that improves pedestrian comfort from unsuitable to suitable for planned activities. This is considered significant for the assessment.
- **Minor Beneficial:** Any effect that improves pedestrian comfort from unsuitable to marginal/tolerable for planned activities, or from marginal/tolerable to suitable for planned activities. This is considered not significant**.**
- **Negligible:** Any effect that does not alter the suitability of existing wind conditions with respect to planned activities. This is considered not significant**.**
- **Minor Adverse**: Any effect that worsens pedestrian comfort from suitable to marginal/tolerable for planned activities, or from marginal/tolerable to unsuitable for planned activities. This is considered not significant.
- **Moderate Adverse**: Any effect that worsens pedestrian comfort from suitable to unsuitable for planned and/or existing activities. This is considered significant for the assessment.
- **Major Adverse**: Any effect on wind conditions that adversely impacts pedestrian safety, transforming conditions from safe to unsafe. This is considered significant for the assessment.

Assumptions and limitations

20.4.37. The analysis reported in this document uses CFD models to simulate the likely wind speeds under a variety of wind conditions, for comparison against the Lawson LDDC criteria.

20.4.38. CFD is widely used for this purpose, however, it is important to note that modelling results of physical phenomena have uncertainty and therefore are not intended to provide an exact representation of the real-life performance, as necessary simplifications and assumptions are made.

20.4.39. The current PWC assessment considers general use patterns (i.e., sitting, standing, strolling, and walking) in accordance with the Lawson LDDC criteria and therefore some more detailed effects have not been considered at this stage including:

- Specialised activities (e.g., sailing, aviation, sports, particle transport, fire safety, etc.).
- Structural effects, resonance calculations, fluid-structure interactions, and acoustic effects.
- Ventilation of internal spaces, wind gusting, urban heat island effects and pollutant tracking.
- Wind effects during construction phases.

20.4.40. Modelling for construction phase was not conducted as wind conditions during construction are often temporary and rapidly changing, and the focus is on ensuring long-term pedestrian comfort and safety in the final urban environment rather than during short-term construction activities. Operational impacts would also demonstrate the worst-case scenario for wind conditions.

20.4.41. The landscape design used in the PWC has been updated since the methodology and associated modelling has been undertaken. This design update included the introduction of additional trees along Great Ancoats Street. No additional modelling was undertaken as the introduction of these trees would improve wind conditions across the Site and no adverse impacts would be introduced.

Consultation

20.4.42. A Scoping Report (ES Volume 4 Appendix 4.1) was submitted to MCC on 30th September 2024 with a formal request for an EIA Scoping Opinion in accordance with Regulation 15 of the EIA Regulations.

20.4.43. No comments were made on the scope of the wind assessment within the formal scoping opinion.

20.5. Baseline conditions

20.5.1. Local wind conditions for the Site have been determined by accessing Meteoblue weather data from within the Simscale platform. This dataset has the most accurate weather information available for the Site.

20.5.2. The existing Site is surrounded by medium-rise and low-rise buildings, comprising residential and commercial uses, as well as an adjoining school, canal, marina and Cotton Field Park. As a result, the wind conditions are dominated by the medium-rise nature of the surrounding buildings. Wind conditions are expected to be suitable for a combination of strolling and short-term standing / sitting and thus suitable for comfortable pedestrian passage.

Scenario 1 – Existing Context

20.5.3. The geometries in Scenario 1 (existing Site context), shown in Figure 20-6, represent a simplified version of the massing and height of the buildings within the area, based on the information available, without the Proposed Development.

20.5.4. The results in Figure 20-6 show that no areas of discomfort are present in the existing scenario.

20.5.5. The yellow outlined area shown to highlight the approximate Site location primarily falls within the dark blue region (A), indicating that wind speeds in this area are 2 m/s or less for less than 5 % of the time. This suggests that the outlined area is highly suitable for outdoor dining, offering comfortable wind conditions for pedestrians.

20.5.6. The presence of light blue and cyan regions nearby indicates that the surrounding areas also offer good to moderate wind comfort suitable for pedestrian sitting and standing.

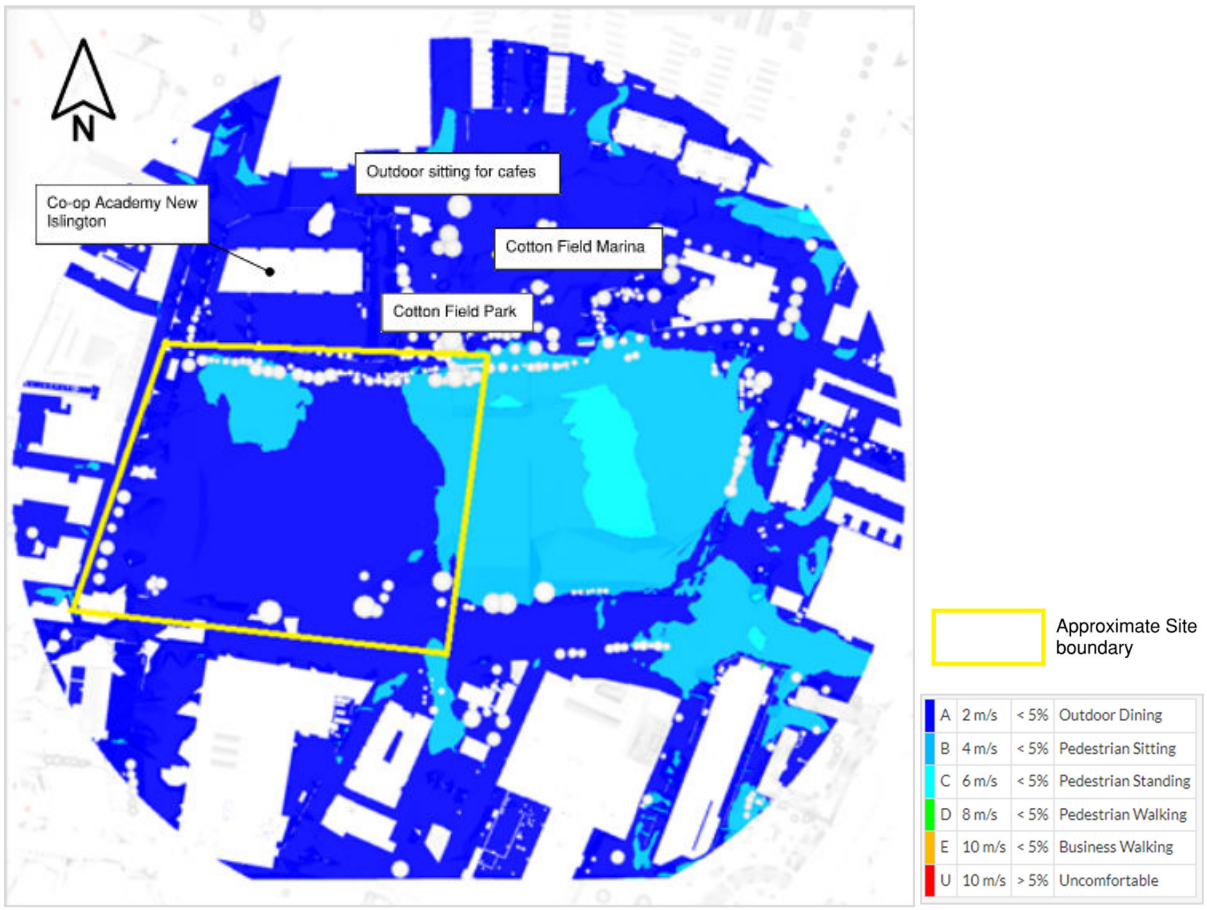


Figure 20-6 – Lawson LDDC Criteria Pedestrian Comfort Map – Existing

20.5.7. Figure 20-7 indicates that there is no risk presented regarding high wind speeds in the proposed Site location per the NEN8100 Pedestrian Safety Criteria as the study area lies completely within Category A of the Safety Criteria.

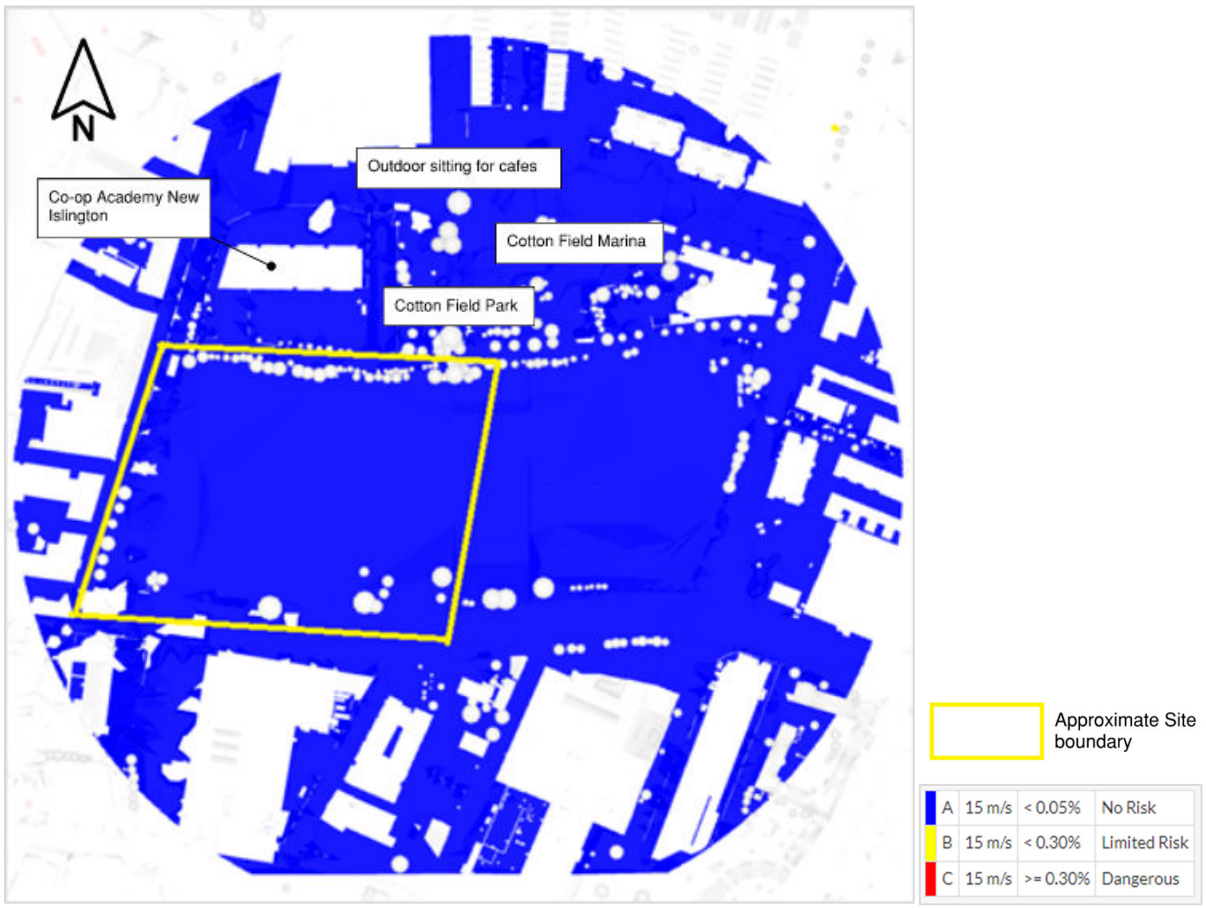


Figure 20-7– NEN8100 Pedestrian Safety Comfort Map – Existing

20.5.8. The baseline assessment therefore shows that the safety criteria for wind in the existing situation is met, and wind comfort levels are suitable for all existing uses.

20.6. Potential impacts

Construction phase

20.6.1. While construction activities are underway, there is a possibility of wind flowing through and across any open spaces within the Site, potentially causing minor inconvenience to pedestrians. This will however be similar to the existing baseline given the current Site is made up of open space. No modelling has been carried out of wind levels during construction as these conditions are temporary and short-term in nature and change as construction progresses.

20.6.2. In terms of the intensity of the wind conditions, a shift is anticipated to occur progressively from the existing baseline conditions to the final state of the Proposed Development.

Operation phase

20.6.3. During operation of the Proposed Development there is the potential for uncomfortable wind conditions to affect designated pedestrian activities, according to the Lawson LDDC criteria, influenced by the orientation of the North and South Buildings and the landscape design.

20.6.4. Detail of the intended uses of the Proposed Development is required in order to assess the effects of the wind environment on pedestrian comfort. For the majority of the surrounding of the Proposed Development and the associated open spaces, the likely pedestrian activity will be walking to access the buildings. For the Proposed Development, the intended uses include pedestrian routing, and areas where outdoor and recreational activities are likely to take place.

20.6.5. Receptors assessed include:

- Building Entrances and The Boulevard.
- Recreational Spaces: including Cotton Field Park and the Canal Plaza to the west of the North and South Buildings.
- Roof Maintenance Access Route and Area.
- The Surrounding Area: including the Co-op Academy New Islington Primary School and Cafés north of the Marina.

20.7. Assessment of effects

Construction phase

Embedded mitigation

20.7.1. The following embedded mitigation measures will be implemented during the construction phase of the Proposed Development:

- The appointed contractor is expected to follow the Considerate Contractors Scheme to minimise the impact of wind effects caused by construction work during the construction period.
- Regular site audits or high-level monitoring can provide insights into the construction stage securing scaffolding to prevent accidents and ensure worker safety. This should include proper bracing and inspections throughout the project.
- If building wraps are to be used, their installation and maintenance should be detailed to protect the structure and the surrounding environment.
- Covering all materials to prevent windblown particulates. This can be achieved through tarps or other suitable coverings, which should be secured properly to withstand environmental conditions.
- Consider including other best practices such as regular site inspections and adherence to local regulations regarding dust control and environmental protection.

Construction effects

20.7.2. During construction, wind might blow across open and exposed areas, potentially disrupting pedestrians. Construction sites conditions are usually dusty and untidy resulting in pedestrians and local communities experiencing a change in comfort levels. Construction sites, with hoardings and restricted access, are less sensitive to wind compared to the completed development. Construction workers and other related Site personnel will find conditions acceptable. The wind effects during construction are considered negligible and not significant.

Operation phase

Embedded Mitigation

20.7.3. The wind microclimate has been considered throughout the design of the Proposed Development and the MDC Landscape design model.

20.7.4. Wind mitigation measures include the introduction of soft landscaping within the site and surrounding the buildings, including the planting of approximately 84 trees. These are located throughout the Site as seen within Landscape Design plans (MDCX-ATR-ZZ-ZZ-DR-L-231000)

Operation effects

Scenario 2 - Proposed Development in the cumulative surrounding context

20.7.5. The geometries in Scenario 2 (introduction of Proposed Development) represent a simplified version of the massing and height of the buildings within the area, based on the information available. The model includes the existing scenario, cumulative developments, the North and South Buildings and landscape proposals for the Proposed Development.

20.7.6. Figure 20-8 demonstrates that the new buildings affect the pedestrian wind comfort conditions of the Proposed Development, and areas around the perimeter of the buildings are expected to experience local wind acceleration.

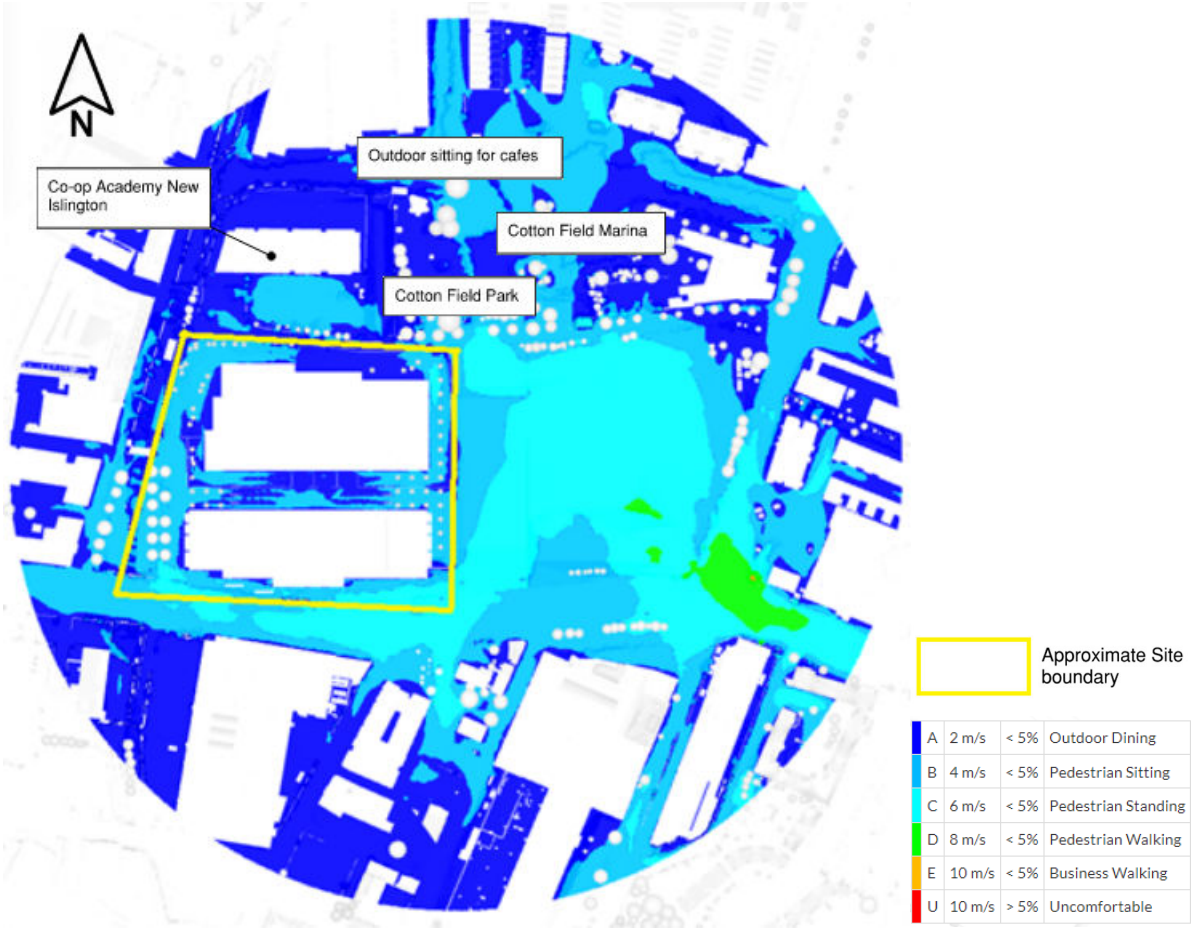


Figure 20-8– Lawson LDDC Criteria Pedestrian Comfort Map – Proposed Scenario

20.7.7. The area immediately around the buildings and the café area next to New Islington Marina are mostly dark blue (A), indicating wind speeds of 2 m/s or less for less than 5 % of the time. This suggests that the surroundings of the building are suitable for outdoor dining, with low wind speeds making it a comfortable area for pedestrians to sit and dine.

20.7.8. Further away from the buildings, areas around the Co-op Academy New Islington Primary School are light blue (B), which shows they are suitable for pedestrian sitting. This indicates a slight increase in wind speeds, but levels remain within comfortable limits for activities such as sitting and standing by pedestrians.

20.7.9. A greater distance from the buildings, there are cyan (C) and green (D) areas. These areas have wind speeds of up to 6 m/s and 8 m/s, respectively, suitable for pedestrian standing and walking. These areas indicate a gradient of increasing wind speeds; however, they are still within comfortable limits for pedestrian activities such as pedestrian walking and standing.

20.7.10. Overall, the PWC assessment indicates that the design is suitable for the expected wind conditions and the predicted wind levels would not exceed the relevant comfort and safety criteria thresholds.

20.7.11. Detailed results of wind speed contours for each assessed wind direction are reported in ES (Volume 4) Appendix 20.1.

20.7.12. Figure 20-9, Figure 20-10, and Figure 20-11 present the pedestrian wind comfort results against Lawson LDDC criteria for the Proposed Development, focused on the areas immediately surrounding the proposed buildings, presenting the results from different angles.

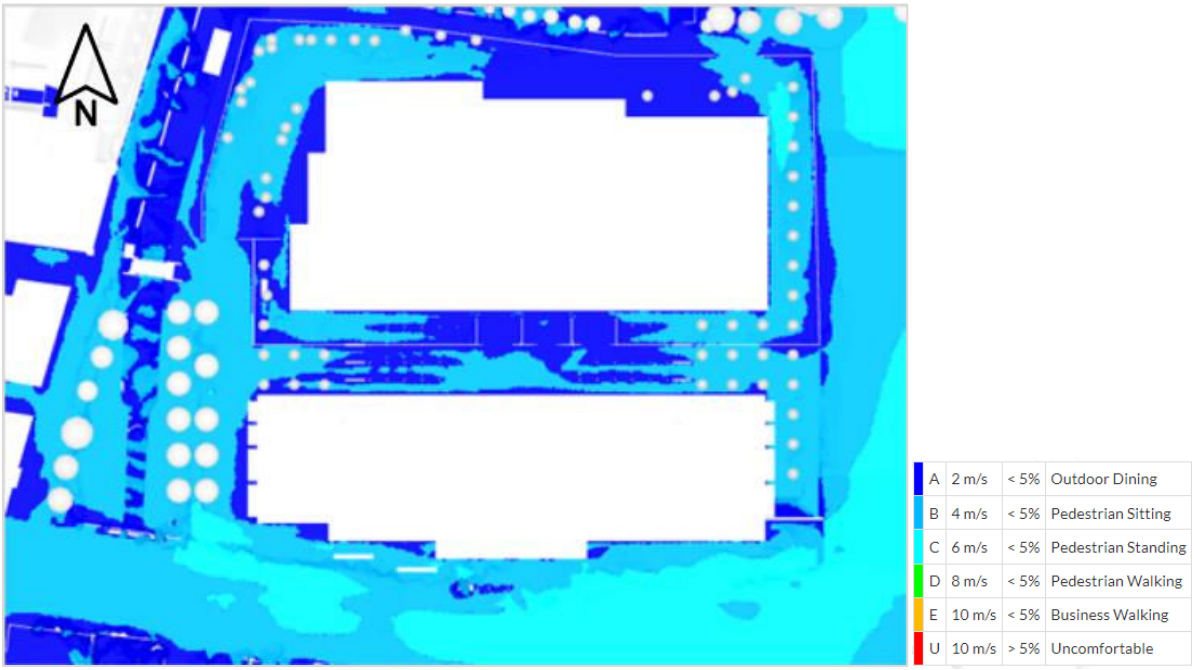


Figure 20-9– Lawson LDDC Criteria Pedestrian Comfort Map – Plan view of the Proposed Scenario

20.7.13. Figure 20-10 and Figure 20-11 illustrate that the North and South Building roof areas are both safe and pleasant for the proposed rooftop maintenance activities.

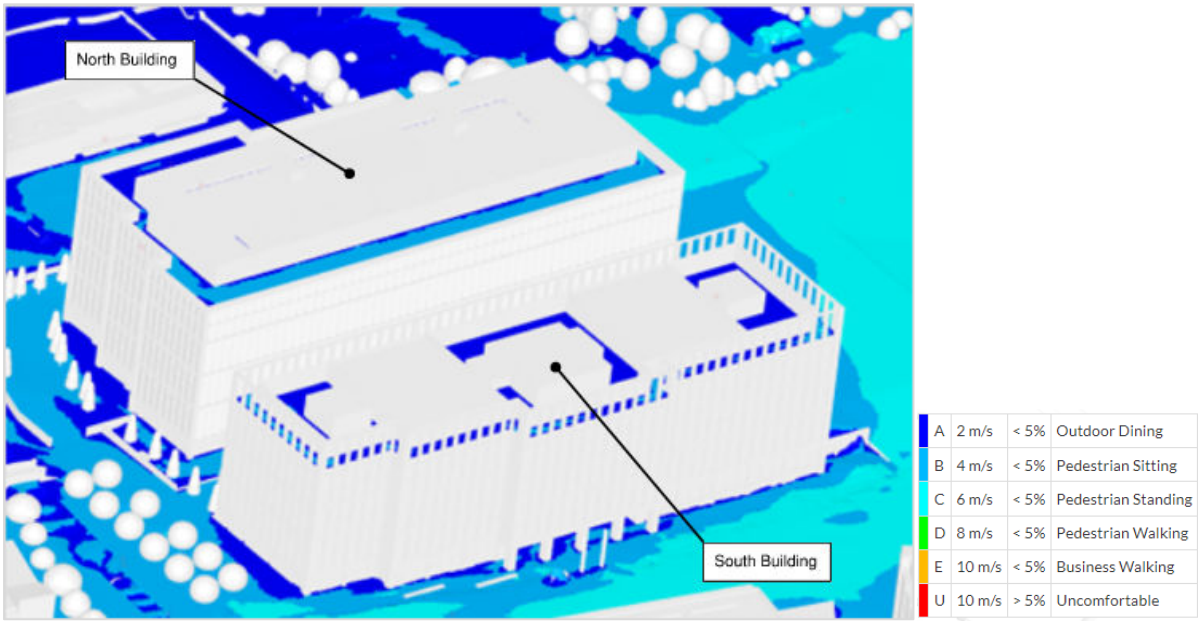


Figure 20-10– Lawson LDDC Criteria Pedestrian Comfort Map of the Proposed Scenario – view from the canal plaza foreground

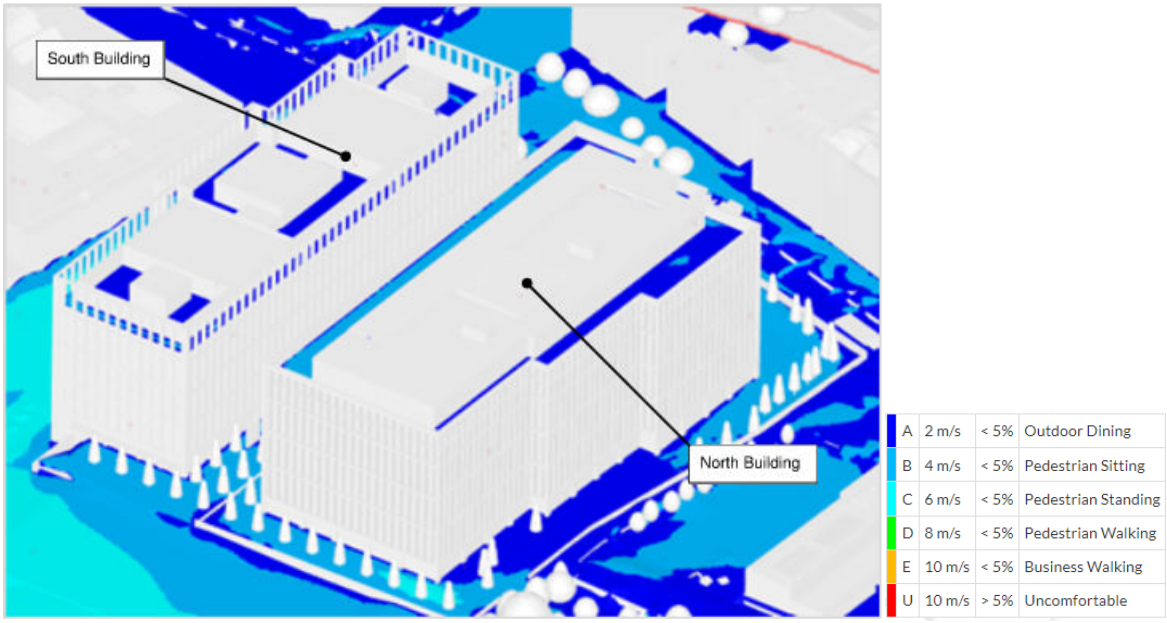


Figure 20-11– Lawson LDDC Criteria Pedestrian Comfort Map of the Proposed Scenario – view from the northeast corner

20.7.14. The comfort areas illustrated by Figure 20-9, Figure 20-10, and Figure 20-11 demonstrate:

- Dark blue areas (A) experiencing wind speeds of 2 m/s or less for less than 5 % of the time are found directly adjacent to the building, particularly on the north and south sides. This suggests that these areas are highly suitable for outdoor dining, offering very low wind speeds and high comfort.
- Light blue areas (B) experiencing wind speeds of 4 m/s or less for less than 5 % of the time are found mainly around the perimeter of the building, particularly on the eastern side and some parts of the western side. These areas are suitable for pedestrian sitting, indicating low wind speeds and good comfort.

- Cyan areas (C) experiencing wind speeds of 6 m/s or less for less than 5 % of the time are scattered further out from the building, especially on the northern and southeastern sides. These areas are appropriate for pedestrian standing, showing moderate wind comfort.
- Green areas (D) experiencing wind speeds of 8 m/s or less for less than 5 % of the time are present further away from the building, indicating a gradient of increasing wind speeds as you move away from the central buildings. These areas are suitable for pedestrian walking, reflecting higher but still comfortable wind speeds for walking.

20.7.15. Overall, the dark blue and light blue areas indicate highly comfortable conditions for outdoor dining and sitting, suggesting these areas can be utilised for outdoor cafés, seating, and socialising spaces. The cyan and green shading shows that areas further out still offer good conditions for standing and walking, making them suitable for walkways and outdoor space.

20.7.16. Figure 20-12 indicates the area directly around the building and the whole study area is shaded in blue, meaning there is no risk from high wind speeds of 15 m/s or more. This suggests that the surroundings of the buildings are safe for pedestrians regarding wind risk based on the NEN8100 Pedestrian Safety criteria.

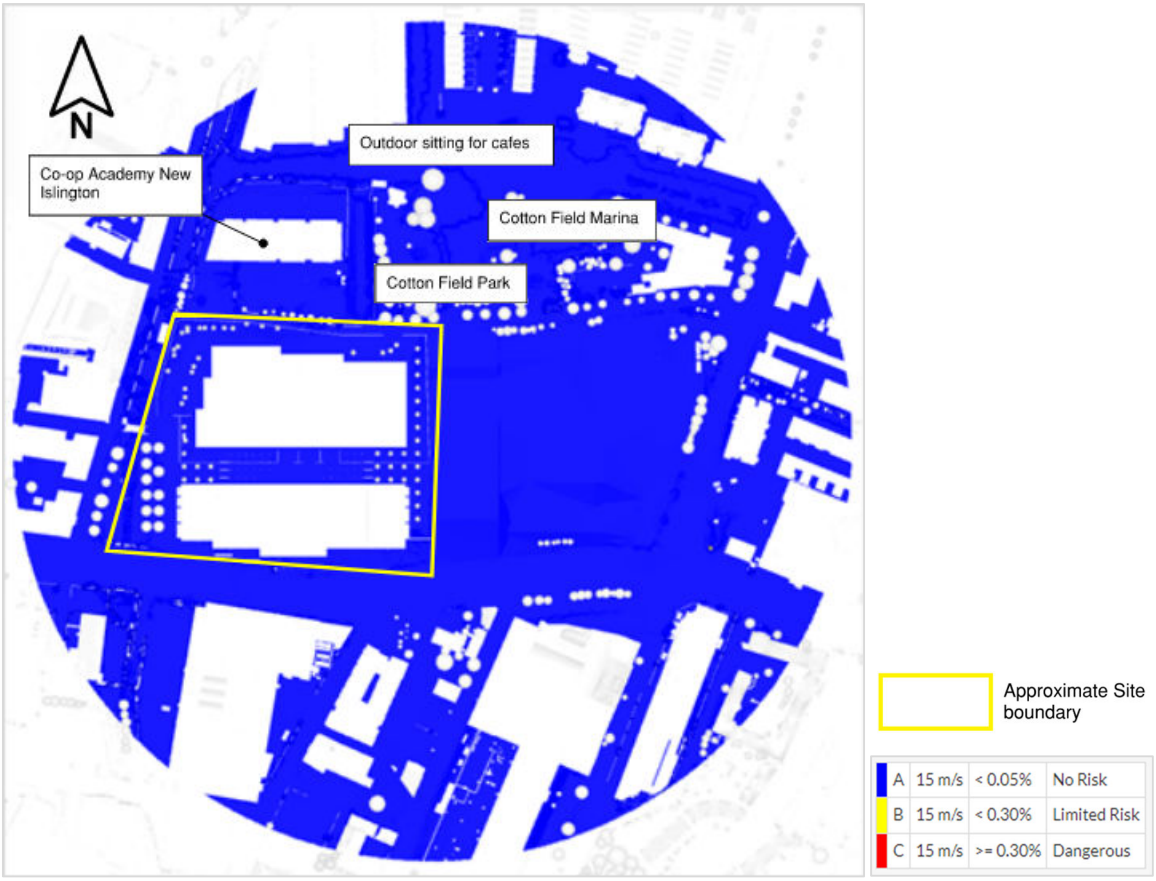


Figure 20-12– NEN8100 Pedestrian Safety Comfort Map – Proposed Scenario

Significance

Building Entrance and The Bouevard

20.7.17. The wind conditions at the entrances of the North and South buildings are suitable for comfortable entry/egress and as a pedestrian seating area. This is considered a negligible effect of the Proposed Development.

Recreational spaces

20.7.18. The wind conditions at the recreational sitting areas on the canal side of the South Building are suitable for pedestrian sitting after the introduction of the Proposed Development. This area was previously suitable for outdoor dining, and this therefore is considered a minor adverse effect, but remains appropriate for the intended uses.

20.7.19. The Canal Plaza is suitable for occasional sitting and Great Ancoats Street has the availability for standing and very comfortable for walking, as intended for its use. This is a considered a negligible effect.

20.7.20. The Boulevard between the North and South Buildings is suitable for frequent sitting and some of the areas are available for occasional sitting after the introduction of the Proposed Development. This is considered a minor adverse**,** as previously it was suitable for outdoor dining, but remains appropriate for the intended uses.

Roof Maintenance Access Route

20.7.21. The North Building roof maintenance access route is suitable for the proposed indicative activities, indicating that this has a negligible effect. The South Building roof maintenance access route is suitable for frequent sitting for most of the time and is also suitable for the planned activities, it therefore has negligible effect.

Surrounding area

20.7.22. The Proposed Development will influence wind conditions within surrounding areas. Specific receptors include users of the Co-op Academy New Islington Primary School, the cafés next to New Islington Marina and Cotton Field Park. The predicted wind conditions in the café area are appropriate for its proposed use. The Proposed Development will increase wind levels and therefore reduce comfort levels within Cotton Field Park but not significantly. Wind levels in Cotton Field Park would therefore still be suitable for outdoor recreation by users. The café is suitable for outdoor dining, and the Great Ancoats Street will be suitable for pedestrian standing and very comfortable for walking. The Co-op Academy New Islington Primary School will be comfortable for pedestrian sitting and the other proposed uses including walking, standing and outdoor recreation. Overall, these constitute a minor adverse effect.

20.7.23. The highest wind speeds are present to the east of the Proposed Development, with a very small area suitable for only pedestrian business walking such as people commuting or walking across an area. However, these are considered within comfortable limits for the intended activities such as walking that will occur within the area as it is not designed for pedestrian activities of sitting and standing. Overall, this is a minor adverse effect.

Overall

20.7.24. Following construction of the Proposed Development, wind conditions (speed and duration) within the study area are predicted to meet Lawson LDDC Criteria and NEN8100 safety criteria. All intended areas are suitable for their intended uses. The Proposed Development is therefore considered to have a minor adverse impact on local wind conditions and microclimate, which is considered not significant.

20.8. Additional mitigation and enhancement measures

20.8.1. The assessment indicates the Proposed Development will not have significant impact on wind levels and therefore there is no requirement to specify additional mitigation measure or enhancement as the Site is suitable for proposed and existing uses.

20.9. Residual effects

20.9.1. As the Site is suitable for proposed and existing uses and there is no need for additional mitigation or enhancement measures, the residual effects are unchanged from the main assessment and no significant residual effects are expected from the Proposed Development.

20.10. Cumulative effects

20.10.1. This section considers the cumulative effects of the Proposed Development (intra-project cumulative effects) and the Proposed Development interacting with other RFFPs (inter-project cumulative effects) from the perspective of impacts within the scope of the Wind and Microclimate topic.

Cumulative Effects Assessment

20.10.2. The further consideration of cross-topic intra-project and inter-project cumulative effects is reported in Chapter 22: Cumulative Effects.

Intra-project in-combination cumulative effects assessment (single project impacts) within topic

20.10.3. The focus of intra-project CEA is understanding how receptors may experience a number of different types of impacts from the Proposed Development at the same time. Within this topic assessment, the PWC analysis methodology is inherently cumulative as the wind speed and duration are taken into account for all receptors. Therefore, there are no additional intra-project cumulative effects from the assessment of wind microclimate to report in this section.

Inter-project cumulative effects assessment (different project impacts) within topic

20.10.4. The inter-project cumulative effects assessment ‘within topic’ element for the wind and microclimate assessment has been completed with reference to the shortlist list of RFFPs that has been developed for the Proposed Development. The list is based on a review of all developments known to the planning system using the methodology described in Chapter 22 Cumulative Effects.

20.10.5. To complete the cumulative effects assessment inter-project ‘within topic’ element, as part of the Scenario 2 PWC assessment, the cumulative impact on pedestrian comfort at ground level from all the development identified within the RFFP shortlist has been considered to provide a comprehensive assessment. The list is based on a review of all developments known to the planning system and includes:

- 128191/FO/2020 - Development comprising of five office buildings with flexible ground floor use at land between Ashton Canal and Pollard Street.
- 132574/FO/2021 - Development comprising 4 townhouses at Paradise Wharf.
- 126608/FO/2020 - Development of 66 residential units between Store Street and Ashton Canal.
- 135662/FO/2022 - Development of 154 Bedroom Hotel with ancillary café / bar / restaurant and gym adjacent to Great Ancoats Street and south of Laystall Street.
- 135675/FO/2022 - Development of two apartment buildings comprising 267 dwellings at Tariff Street.

- 137346/FO/2023 - Mixed use development comprising commercial floorspace and 256 residential units adjacent to Poland Street and between Naval Street and Jersey Street.
- 122598/FO/2019 - Mixed use development comprising 94 residential units consisting of townhouses and apartments as well as commercial floorspace at New Islington Marina.
- 128911/FO/2020 - Mixed use development consisting of office space and 89 residential units at Laystall Street.

20.10.6. The modelling output has been used to identify whether any of the RFFPs required more detailed qualitative analysis due to changes in category of overall comfort. This identified one RFFP to undertake further analysis. The following RFFP has been screened in to the assessment:

- 122598/FO/2019 - Mixed use development comprising 94 residential units consisting of townhouses and apartments as well as commercial floorspace at New Islington Marina.

Potential inter-project impacts

20.10.7. The mixed use development comprising 94 residential units consisting of townhouses and apartments as well as commercial floorspace at New Islington Marina is situated just north of the marina and judged to impact the Proposed Development. A detailed assessment was carried out in this area, with results indicating that wind speeds may experience some acceleration in the surrounding area around the RFFP, particularly impacting corners of the Proposed Development. However, the assessment of results demonstrate that the proposed design and activities remain within the wind comfort safety criteria, ensuring that the development will not adversely impact the usability and safety of the space, as illustrated by Figure 20-8 which has included this RFFP as part of the wind modelling assessment.

20.10.8. All other developments outside the assessment radius (240-meter radius from the MDC Campus) are sufficiently distant from the Proposed Development, making their potential cumulative effects negligible and not warranting inclusion in the assessment.

Mitigation measures

20.10.9. No mitigation measures are required as no inter-project impacts are expected. The impact of each RFFP and the Proposed Development acting together on other receptors within the study area is considered within the inter-project cross-topic Chapter 22 Cumulative Effects.

Summary of Cumulative Effects

20.10.10. Following the introduction of cumulative surroundings, combined with the Proposed Development, wind conditions within the study area remain comfortable for the planned activities in terms of comfort suitability for designated uses and pedestrian safety.

20.11. Summary and conclusions

20.11.1. The wind microclimate analysis was carried out using computational fluid dynamics (CFD), utilising the platform Simscale to perform the simulations. Transient simulations have been conducted using the LBM and the k-ω SST turbulence model.

20.11.2. The simulation model and results were based on two scenarios

- Scenario 1: Existing Site within the context of the baseline surrounding conditions.

- Scenario 2: Proposed Development within the context of existing surrounding conditions plus committed cumulative planned developments with soft landscaping and wind mitigation measures.

20.11.3. The results of the simulations performed have shown that the two assessed scenarios meet Lawson LDDC criteria and NEN8100 safety criteria. No areas of discomfort for pedestrian/user activities are present around the Proposed Development.

20.11.4. Results indicate the areas around the Proposed Development can be utilised for their intended uses. These include outdoor cafes, seating, and socialising and recreational spaces.

20.11.5. The cyan and green areas as part of Scenario 2 show that further out areas will experience local wind acceleration but still offer good conditions for standing and walking to the east of the Proposed Development. These areas are still suitable for their intended uses such including walkways and standing areas.

20.11.6. Table 20-5 summarises the topic effects resulting from the Proposed Development.

Table 20-5 – Summary of effects

Resource / Receptor / affected group	Sensitivity of receptor	Activity or impact	Embedded design mitigation	Effect Magnitude Type Spatial extent Duration Likelihood	Significance of effect	Additional mitigation	Residual effect
Construction							
Users / Pedestrians in the surrounding area	High	Pedestrian safety & comfort	N/A	Adverse Negligible Direct Local Temporary Likely	Not Significant	N/A	Not Significant
Operation							
Users / Pedestrians within the Site	High	Pedestrian safety & comfort	Proposed landscape design	Adverse Negligible Direct Local Temporary Likely	Not Significant	N/A	Not Significant
Users / Pedestrians at the entrance within the Site	High	Pedestrian safety & comfort	Proposed landscape design	Adverse Negligible Direct Local Temporary Likely	Not Significant	N/A	Not Significant
Users / Pedestrians at recreational spaces on ground	High	Pedestrian safety & comfort	Proposed landscape design	Adverse Minor Direct Local Permanent	Not Significant	N/A	Not Significant

Resource / Receptor / affected group	Sensitivity of receptor	Activity or impact	Embedded design mitigation	Effect Magnitude Type Spatial extent Duration Likelihood	Significance of effect	Additional mitigation	Residual effect
level within the Site				Likely			
Users / Pedestrians at Roof Maintenance Access Route	High	Pedestrian safety & comfort	Proposed landscape design	Adverse Negligible Direct Local Temporary Likely	Not Significant	N/A	Not Significant
Users / Pedestrians in surrounding areas of MDC buildings	High	Pedestrian safety & comfort	Proposed landscape design	Adverse Minor Direct Local Temporary Likely	Not Significant	N/A	Not Significant
Users / Pedestrians in the Co-op Academy New Islington Primary School	High	Pedestrian safety & comfort	Proposed landscape design	Adverse Minor Direct Local Temporary Likely	Not Significant	N/A	Not Significant
Users / Pedestrians in the cafés next to New Islington Marina	High	Pedestrian safety & comfort	Proposed landscape design	Adverse Minor Direct Local Temporary Likely	Not Significant	N/A	Not Significant

20.12. Glossary and Acronyms

Table 20-6 – Glossary and acronyms

3D	3-Dimensional
CFD	Computational Fluid Dynamics
CIBSE	Chartered Institution of Building Services
EIA	Environmental Impact Assessment
ES	Environmental Statement
MDC	Manchester Digital Campus
LBM	Lattice Boltzmann Method
LCC	Lawson Comfort Criteria
LDDC	London Docklands Development Corporation
MCC	Manchester City Council
NEN8100	Dutch wind nuisance standard
NPPF	National Planning Policy Framework
PWC	Pedestrian Wind Comfort
SST	Sheer Stress Transport

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