



DESKTOP WIND MICROCLIMATE STUDY

Greenheys, Manchester Science Park

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CONTENTS

1	INTRODUCTION	4
1.1	SUMMARY	4
1.1	GUIDANCE	5
2	METHOD	6
2.1	ASSESSMENT METHODOLOGY	6
2.2	SITE GEOMETRY	6
2.3	WIND DATA ANALYSIS	6
2.4	TARGET CONDITIONS	11
2.5	LIMITATIONS & ASSUMPTIONS	11
3	RESULTS	12
3.1	DOMINANT WIND ANGLE (S)	12
3.2	SECONDARY WIND ANGLE (W)	12
3.3	TERRACES	12
4	CONCLUSIONS	17

1 INTRODUCTION

This report outlines the results of a desktop wind microclimate analysis to inform a full planning application for the development of Greenheys, Manchester Science Park.

1.1 SUMMARY

Potential wind effects were assessed for Greenheys, Manchester Science Park.

Consideration was given to the potential impact of the proposed development on local thoroughfares, proposed amenity spaces and building entrances.

Various potential risk factors for raised wind speeds were considered.

There is not considered to be a significant risk of raised wind speeds at ground level due to the proposed development.

As such, general thoroughfares and building entrances are expected to be suitable for the intended use.

The eastern terrace is expected to be suitable to the intended use, given the shelter from the westerly winds.

The western terrace is more exposed to the westerly winds. Therefore it may have a risk of raised winds. In order to achieve suitable conditions for seating, further mitigation may be necessary in the form of localised screening, baffles or landscaping.

1.1 GUIDANCE

National Planning Policy Framework

The National Planning Policy Framework (NPPF) was revised in July 2021 by the Department of Communities and Local Government (DCLG). The relevant paragraphs are as follows:

Paragraph 130 of the National Planning Policy Framework states that:

“Planning policies and decisions should ensure that developments[...]create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience.”

There is no specific planning policy guidance dealing with microclimate in terms of pedestrian comfort set out in the revised NPPF

Planning Practice Guidance

The Planning Practice Guidance (2021) identifies the potential for tall and large buildings to affect wind microclimate. The National Design Guide (2021) states in Paragraph 71 that:

“Proposals for tall buildings (and other buildings with a significantly larger scale or bulk than their surroundings) require special consideration. This includes their [...] environmental impacts, such as [...] wind. These need to be resolved satisfactorily”

Greater Manchester Joint Development Plan

The Greater Manchester Combined Authority Joint Development Plan, ‘Places for Everyone’ was published in 2021.

‘Policy JP-P-1 Sustainable Places’ states that “all development [...] should be consistent with: [...] comfortable and inviting, with indoor and outdoor environments: [...] addressing microclimate issues such as sunlight, indoor air quality, overheating, shade, wind and shelter”.

Manchester Core Strategy (2012 – 2027)

Policy EN2 – Tall Buildings – States that, by their very size, tall buildings can have a significant impact on the local environment and its microclimate. It is therefore expected that this impact be modelled and that submissions for tall buildings also include appropriate measures to create an attractive, pedestrian friendly local environment.

2 METHOD

2.1 ASSESSMENT METHODOLOGY

The assessment was performed as a desktop study, combining analysis of wind data from a local weather station with qualified assessment of any likely effects that the development may have on local wind conditions.

The assessment was performed by an experienced wind engineer with 10 years specific experience of performing wind microclimate studies.

The most common effects that a development could have on local wind conditions are as follows:

- Downwash:
 - High speed airflow from higher in the earth boundary layer being directed down to ground level by a building face.
- Corner flows:
 - Acceleration of the airflow due to the large pressure gradients around sharp corners.
- Channelling:
 - Acceleration of the airflow due to the flow paths being constrained between multiple buildings.

2.2 SITE GEOMETRY

A 3D CAD model of the proposed development was used for the analysis, which is shown in Figure 4.

The site is located within a dense urban setting of low to medium rise commercial and residential units, and high rise residential units. The surrounding area is shown in Figure 5.

2.3 WIND DATA ANALYSIS

30 years of wind data were obtained for Manchester Airport. The location of the site relative to the airport is shown in Figure 5.

Seasonal wind roses were created for the weather station. These are shown in Figure 7.

The dominant wind direction is southerly in winter and autumn.

The secondary wind direction, typically observed in spring and summer is westerly.

The dominant wind directions for high wind speeds (hourly wind speeds >8m/s at 10m height at the airport) are 180° to 190°, stronger winds are most likely to occur in winter.

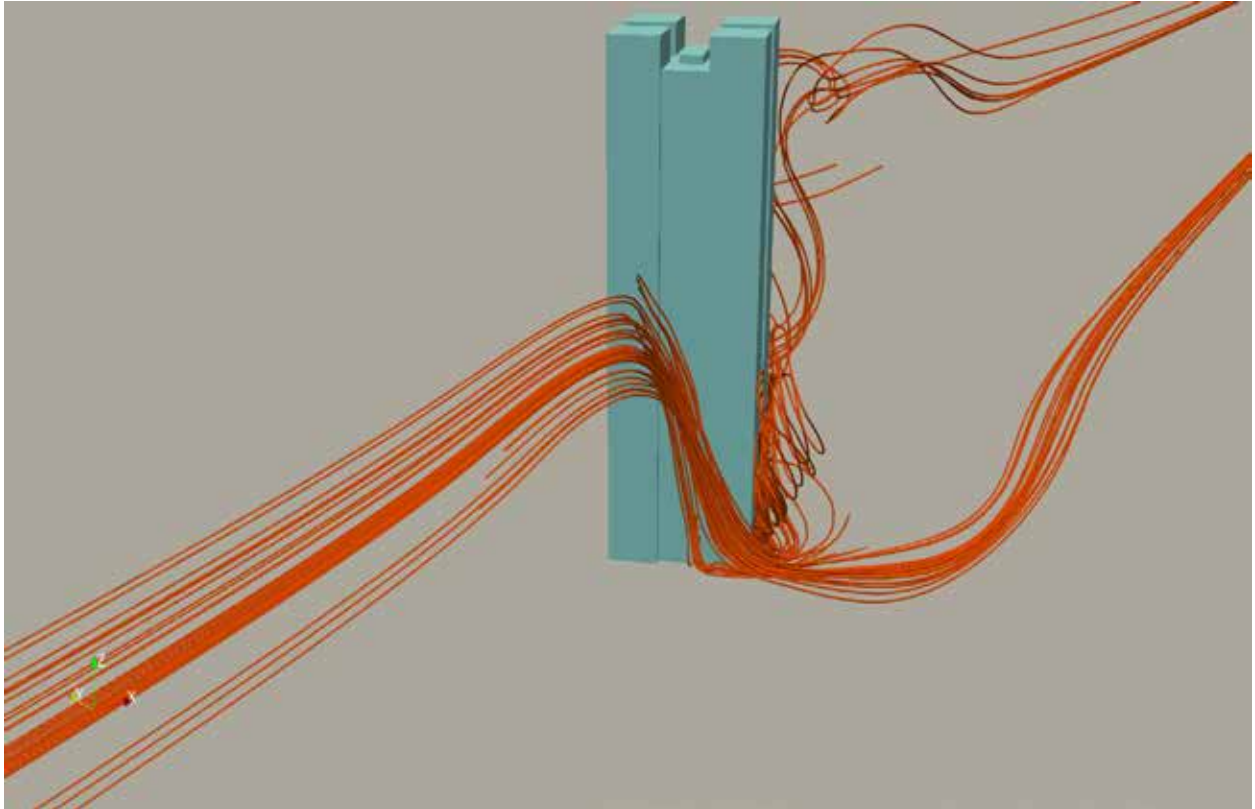


Fig. 01: Downwash

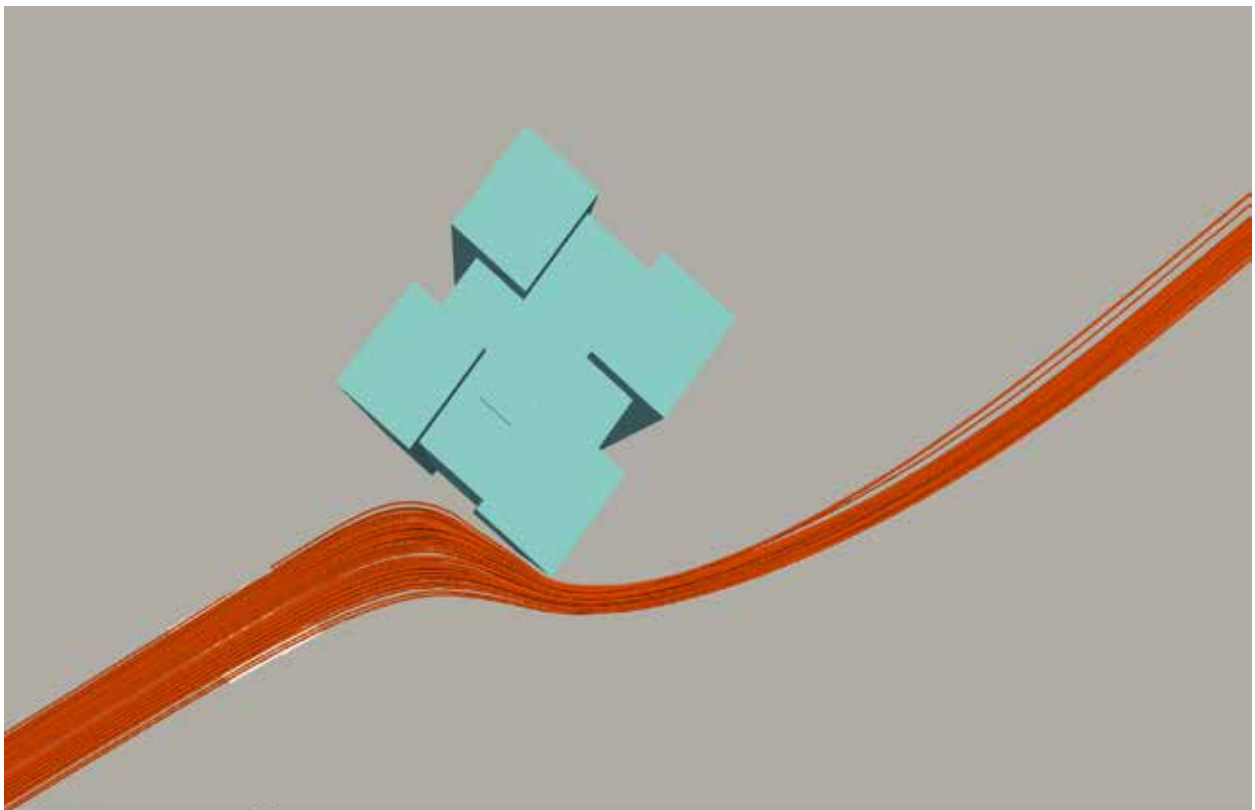


Fig. 02: Corner Flows

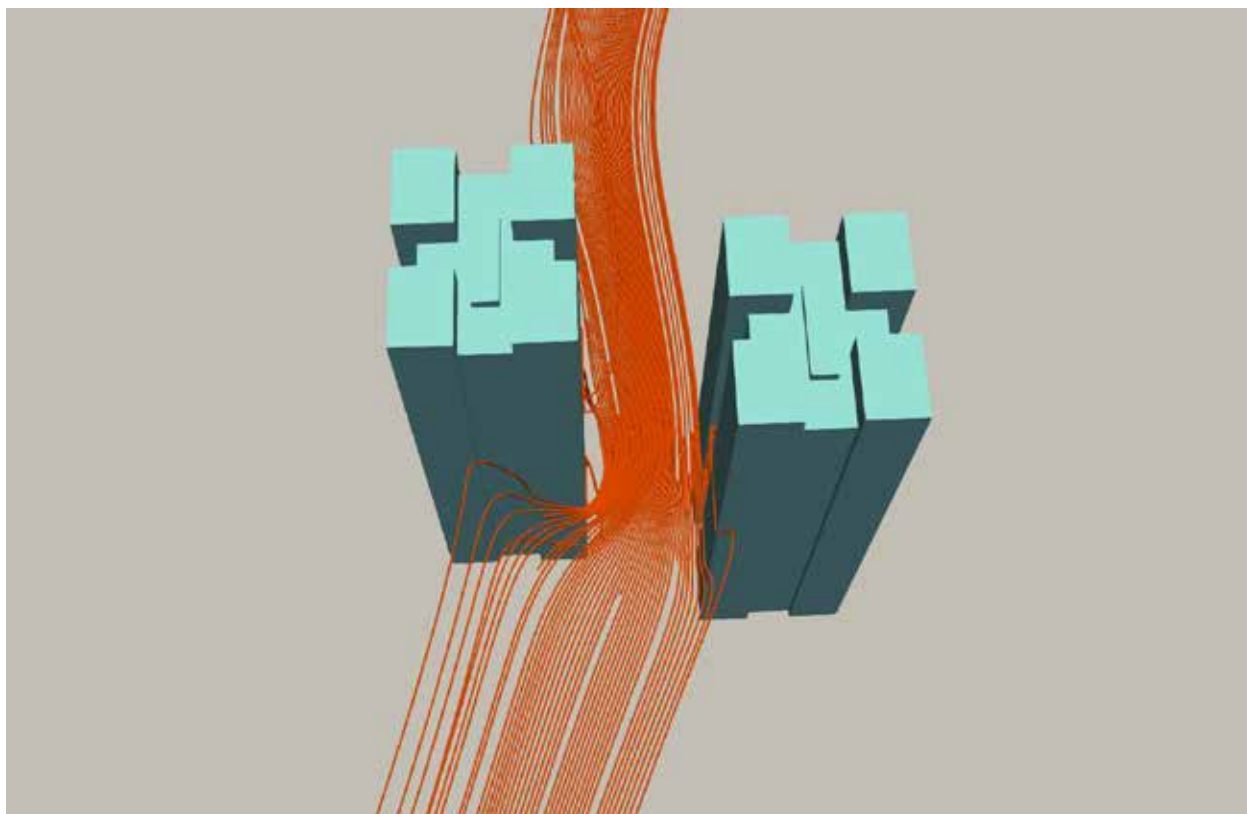


Fig. 03: Channelling

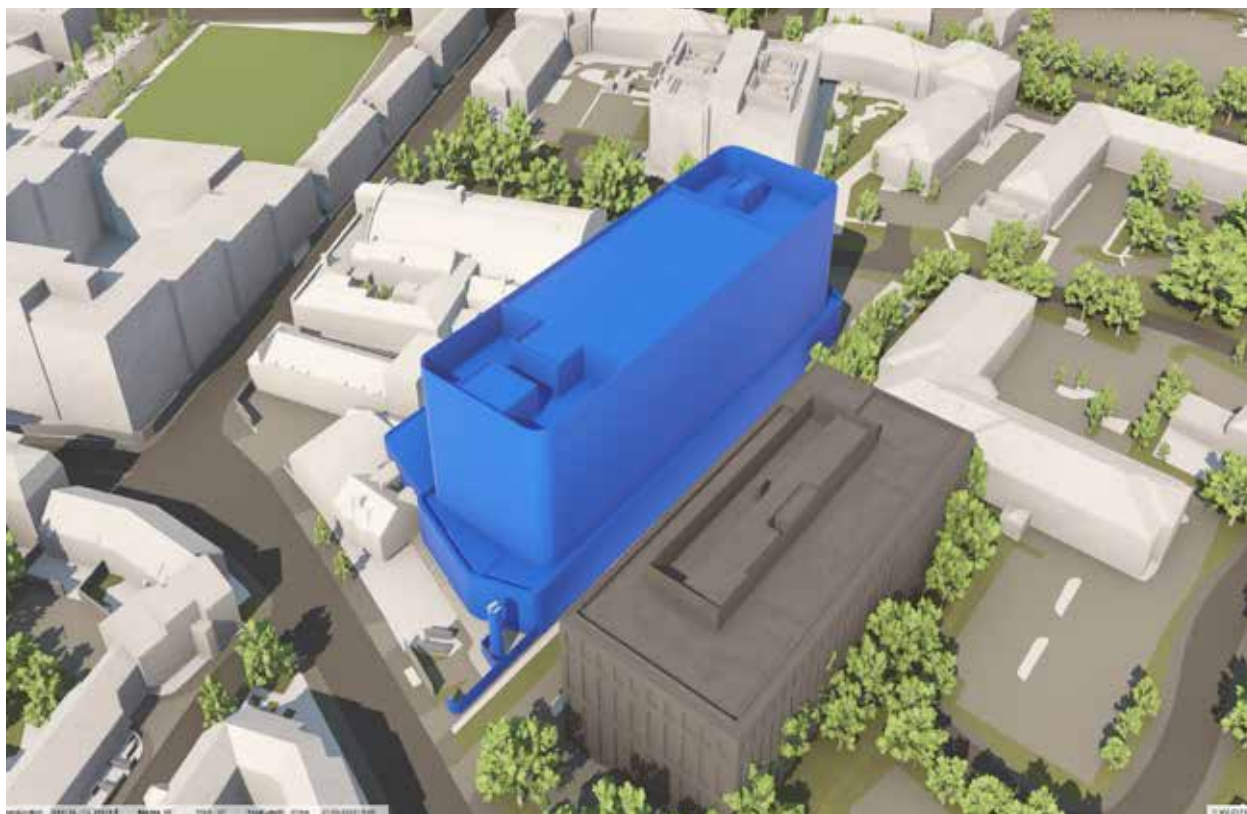


Fig. 04: The Proposed Development (3D view)



Fig. 06: Surrounding Area, with with the site shown shaded in blue.



Fig. 05: Relative Locations of Site and Weather Station

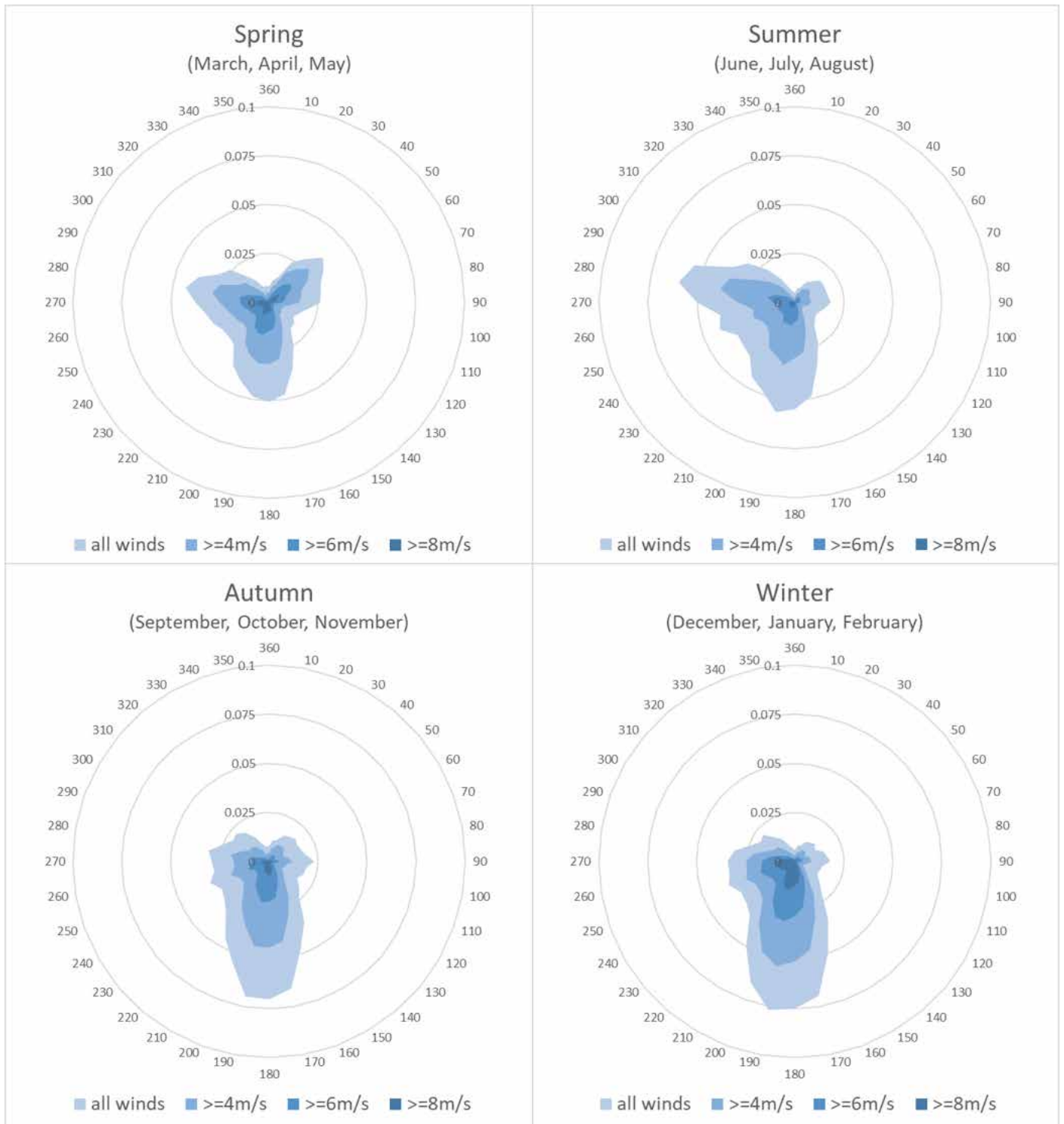


Fig. 07: Wind Roses for Manchester Airport (1991-2021)

2.4 TARGET CONDITIONS

For a mixed-use urban area within which the Site is located, the desired wind microclimate would typically need to have areas acceptable for sitting, standing (including at entrances of buildings) and walking use. A description of the comfort categories to classify wind conditions in accordance with is given below.

Any areas which are predicted to be unsafe (annually) or uncomfortable (for winter) will require mitigation, unless they are in locations where pedestrian access can be controlled in the event of strong winds. This applies to all thoroughfares (for pedestrians) and roads (for cyclists) around the Development.

Any amenity spaces should be suitable for leisure walking in the winter, and for a mixture of sitting and standing in the summer.

The areas immediately outside any building entrances should be suitable for standing use during winter to provide a “buffer” between the still conditions in interior spaces and the general thoroughfare.

2.5 LIMITATIONS & ASSUMPTIONS

This study is a desktop study. This means it does not include any modelling of the actual airflow around the site. Hence any atypical local microclimatic features will not be captured.

The nature of a desktop study means that all results and conclusions are qualitative, and it is not possible to draw quantitative conclusions.

Table 01: Lawson Comfort Criteria (LDDC variant)

KEY	COMFORT CATEGORY	MEAN WIND SPEED (5% EXCEEDANCE)	DESCRIPTION
	Sitting	4 m/s	Acceptable for outdoor sitting use (e.g. cafés, benches, balconies)
	Standing	6 m/s	Acceptable for main building entrances, pick-up / drop-off points and bus stops
	Walking (leisure)	8 m/s	Acceptable for strolling
	Walking (business)	10 m/s	Acceptable for external pavements, walking purposefully without lingering
	Uncomfortable	>10 m/s	Not comfortable for regular pedestrian access

Table 02: Lawson Safety Criteria (LDDC variant)

KEY	SAFETY CATEGORY	MEAN WIND SPEED (0.022% EXCEEDANCE)	DESCRIPTION
	No Safety Exceedance	<15 m/s	
	S15 (Distress)	>15 m/s	Unsafe for frail individuals, or cyclists
	S20 (Safety)	>20m/s	Wind conditions considered unsafe for all users

3 RESULTS

3.1 DOMINANT WIND ANGLE (S)

Figure 8 shows a plan view of the proposed development, with the dominant wind angle highlighted.

The orientation of the building is such that the larger south facade is facing the wind southerly wind angle. With southerly winds meeting the southern facade, the likely location for raised winds on the ground are to the south west and south eastern corners of the building. There are a number of features that will reduce any raised wind speeds. These are discussed below.

Figure 9 shows the proposed development viewed from the dominant wind angle. The western section of the southern facade is sheltered from the southerly winds by the neighbouring 5 Storey Base development.

The terrace that spans the west, south and east façades at level 3, will help to break up the downwash generated by this facade, reducing any associated ground level raised wind speeds.

The curvature of the proposed building at the corners will also reduce the effective area of the southern facade, reducing the downwash being generated.

While lower lying, Rutherford house to the south east will provide shelter for the south east section of the southern facade.

The landscaping plan, shown in Figure 10 shows 6 trees within the boundary on the east of the southern facade. These trees will breakup raised winds generated by downwash, and reduce ground level wind speeds.

The combination of shelter from neighbouring properties, building corner detail, landscaping and terraces, are expected create suitable wind conditions at the ground level, due to winds from the south.

3.2 SECONDARY WIND ANGLE (W)

Figure 8 shows a plan view of the proposed development, with the secondary wind angle highlighted.

It is apparent that, from the secondary westerly wind angle, the smaller building facade is facing the wind. Figure 11 shows the proposed development viewed from the secondary wind angle (westerly). The western face of the proposed development is marked A in the figure.

The building orientation will help reduce the risk of downwash on the western face. The terrace will also break up the downwash and reduce the risk of raised wind speeds on the ground.

3.3 TERRACES

The development has a terrace that wraps from the west, south and eastern facade. This is marked by the letter T on Figures 12 and 13.

The landscaping plan for the terraces is shown in Figure 14.

The eastern terrace is sheltered from the westerly winds, and with the landscaping to the south of the terrace, should have suitable conditions for use.

The westerly terrace is both exposed to the westerly winds, and may suffer raised winds due to downwash of the exposed western face of the development. The landscaping on the terrace consists of 5 trees clustered near the middle of the terrace. These trees will help to provide shelter for the western facade, reducing the likelihood raised winds due to downwash. In order to achieve suitable conditions for seating, further mitigation may be necessary in the form of localised screening, baffles or landscaping.

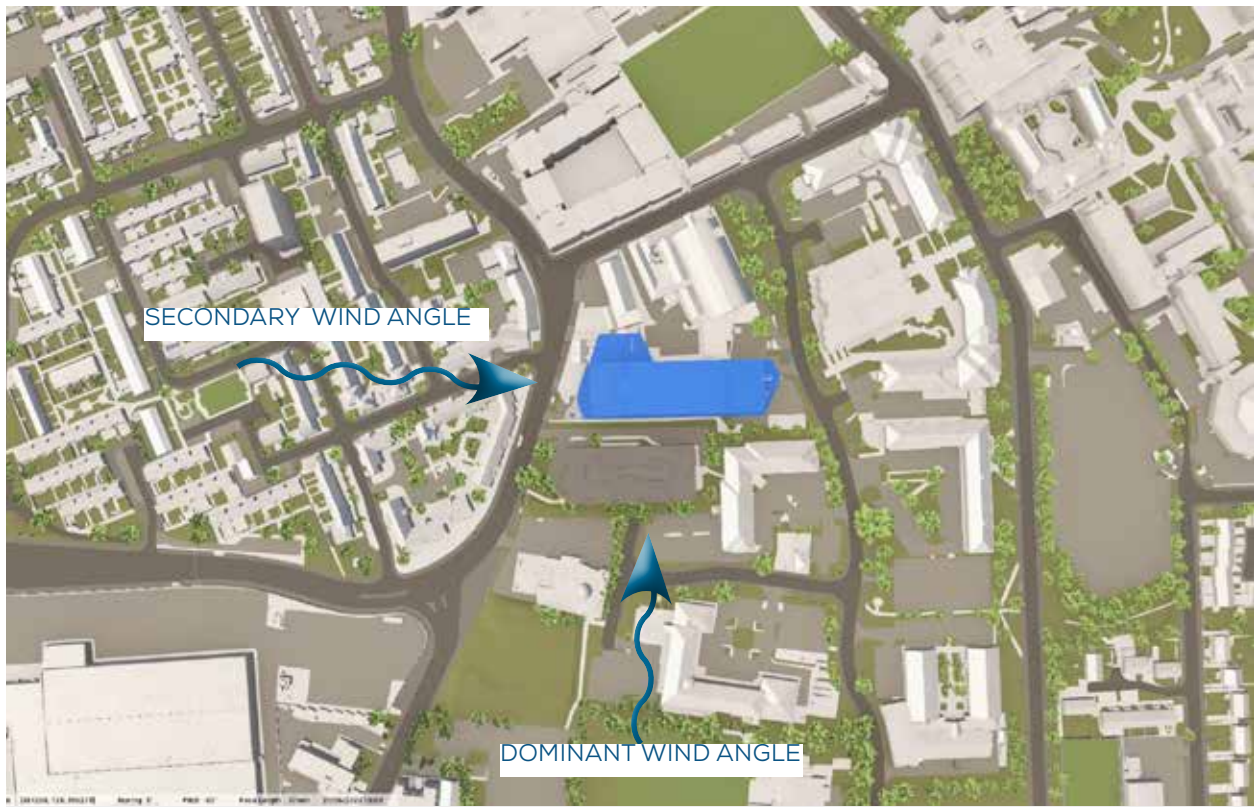


Fig. 08: Plan View of the Proposed Development



Fig. 09: The Proposed Development, as Viewed from the Dominant Wind Angle (South)

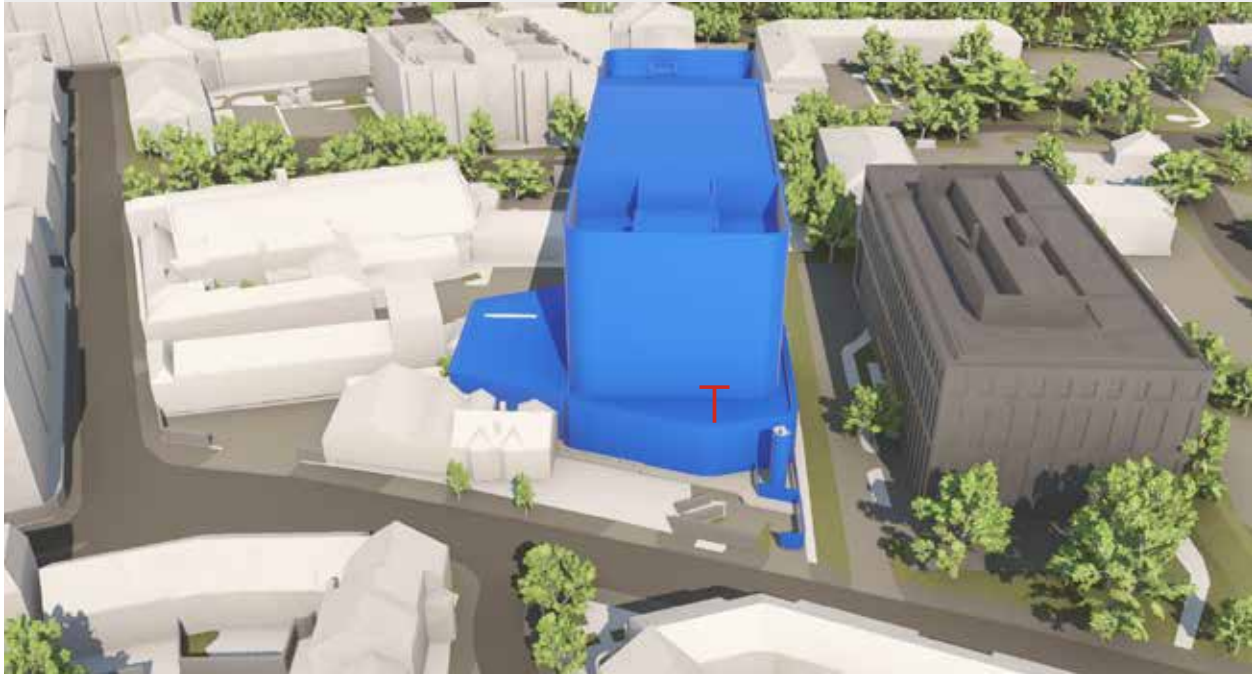


Fig. 12: The Proposed Development's terraces viewed from the west



Fig. 13: The Proposed Development's terraces viewed from the south east

4 CONCLUSIONS

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