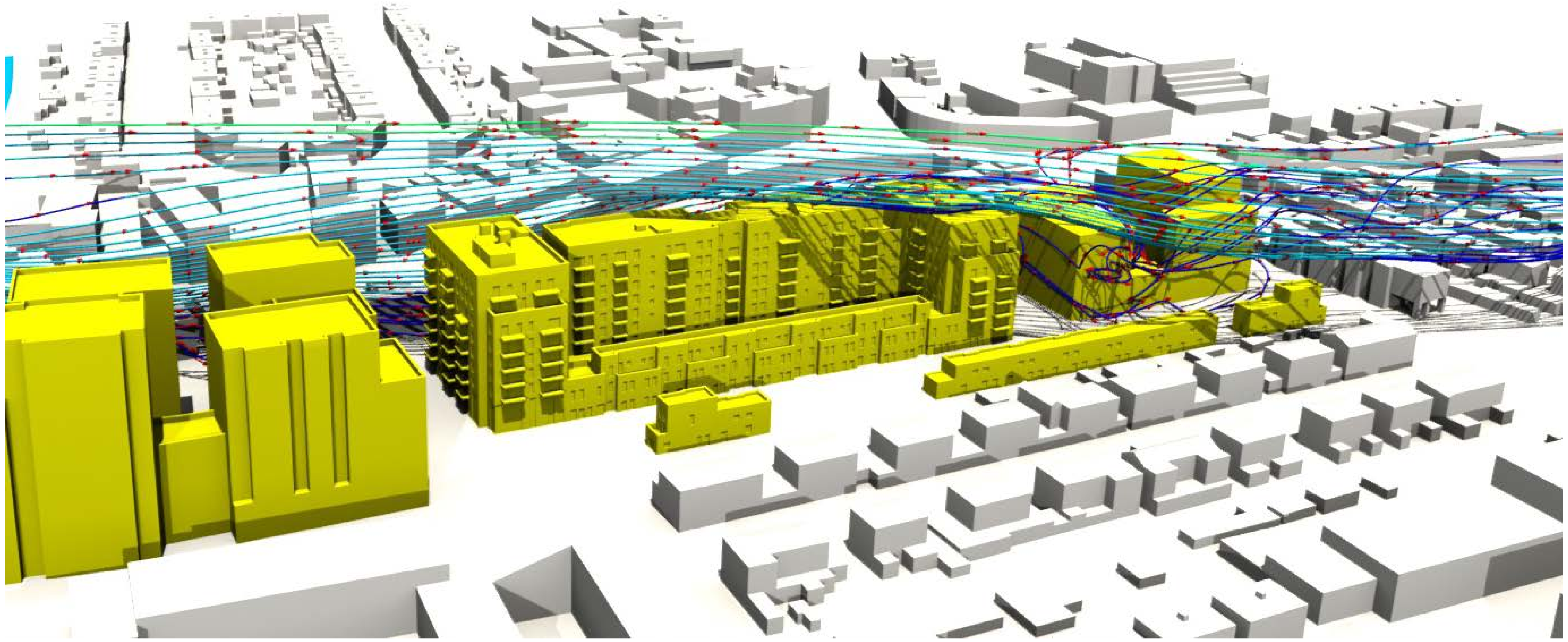
WINDTECH

WIND MICROCLIMATE CFD STUDY

PHASES 2 AND 3, HAYES TOWN CENTRE, LONDON

WH580-04F02(REV2) - WE CFD REPORT
FEBRUARY 9, 2026



Prepared for:

Higgins Partnership
One Langston Road, Loughton
Essex, IG10 3SD

AT THE LEADING EDGE

WINDTECH CONSULTANTS
www.windtechconsult.com
reception@windtechglobal.com

Sydney | Singapore | London | Melbourne | Mumbai | New York | Hong Kong | Dubai | Miami | Toronto

Date	Revison History	Non-Issued Revision	Issued Revison	Prepared By	Instructed By	Reviewed & Authorised By
24/12/2025	Initial	-	0	GB	NO/EC	EC
20/01/2025	Minor Updates	-	1	GB	NO/EC	EC
09/02/2025	Figure 5 Updated	-	2	GB	NO/EC	EC

The work presented in this document was carried out in accordance with the Windtech Consultants Quality Assurance System, which is based on International Standard ISO 9001.

This document is issued subject to review and authorisation by the Team Leader noted by the initials printed in the last column above. If no initials appear, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for our Client's particular requirements which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party and no responsibility is undertaken to any third party without prior consent provided by Windtech Consultants. The information herein should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

The information contained herein is for the purpose of wind engineering only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of wind engineering including and not limited to structural integrity, fire rating, architectural buildability and fit-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.

Executive Summary

This report is intended for the Reserved Matters Application for Phases 2 and 3 of the Hayes Town Centre development. Simulations of the wind microclimate were conducted to quantitatively assess the effect of Phases 2 and 3 of the development on the wind conditions in and around the Site.

The key findings from the study are as follows:

- The wind conditions at ground and elevated levels are safe.
- The results of the assessment also show that the wind conditions at the ground are suitable for the intended use in many areas. However, there is a minor exceedance where the wind conditions are unsuitable for intended use on a single entrance on the southern facade of phase 1.
- The results of the assessment also show that the wind conditions at the elevated levels are suitable for the intended use in all areas.

In the areas where the wind conditions are unsuitable for the intended use, mitigation measures have been implemented in the RMA proposals to ensure conditions are now suitable.

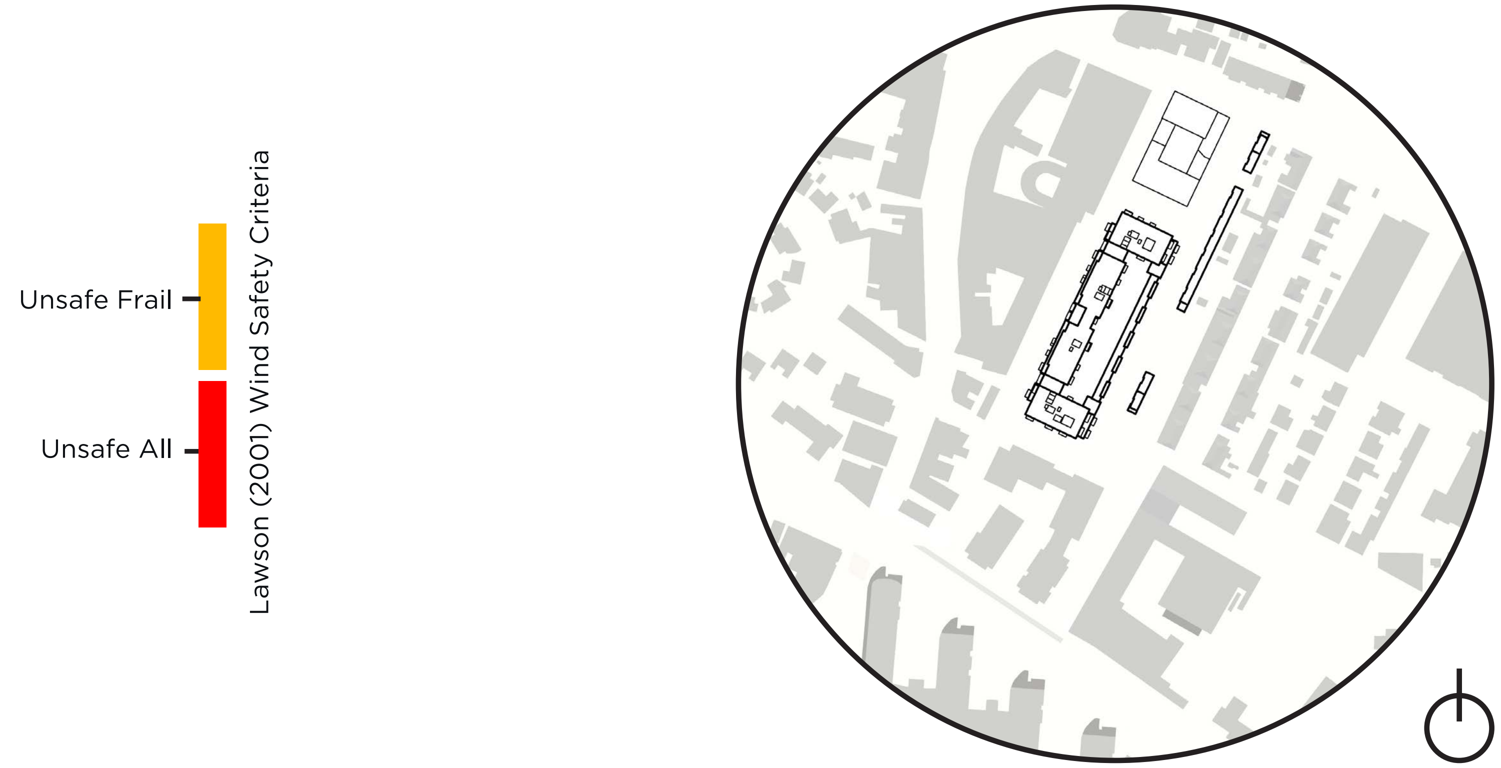


Figure 1. Lawson Safety Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Annual Condition

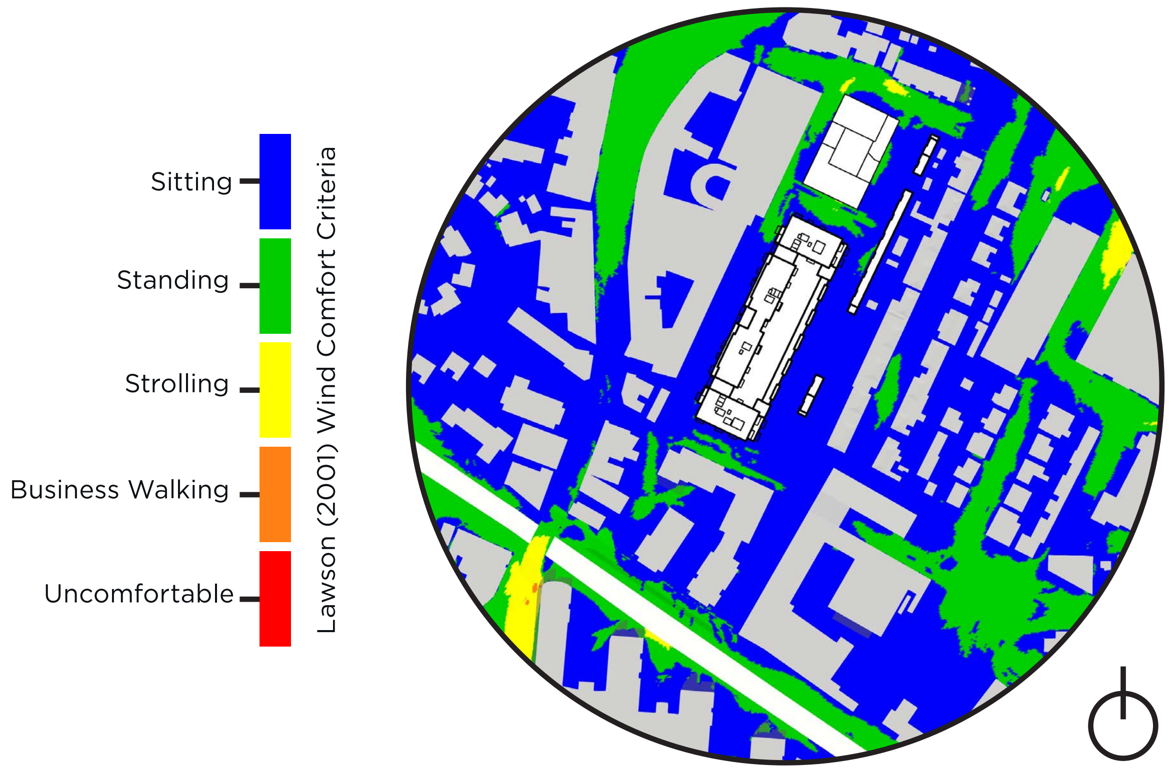


Figure 2. Lawson Comfort Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Winter Condition

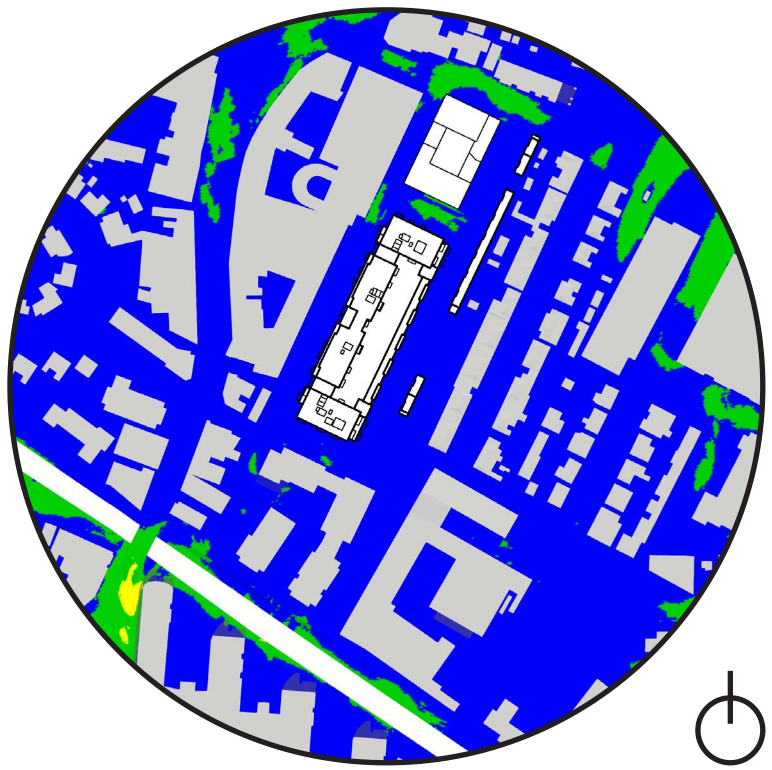


Figure 3. Lawson Comfort Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Summer Condition

CONTENTS

1. Introduction

2. Environmental Wind Speed Criteria

3. CFD Methodology

4. Meteorological Data for London

5. Results and Discussion

6. Summary and Recommendations

7. References

Appendix A - Wind Effects Glossary

Appendix B - Wind Speed Up Fields

Appendix C - Comfort Target Criteria

Appendix D - Tested Mitigation Renders

WINDTECH

1. Introduction

This study has been undertaken by WINDTECH Consultants to assess the wind microclimate around the proposed Phases 2 and 3 of the Hayes Town Centre development in London for the Reserved Matters Application. The model of the proposed development has been based upon the architectural drawings and the 3D model received on December 8th, 2025.

Description of the Site

The Site for the proposed development is bound by Crown Close, Pump Lane, Little Road and the Grand Union Canal. The surrounding areas predominantly consist of low-to-mid-rise buildings. Figure 4 shows the Existing Site. Figure 5 shows the Proposed Site.

Scope of the CFD Study

The simulations of the wind microclimate were conducted to quantitatively assess the effect of the proposed development on the wind conditions in and around the Site.

The assessment was undertaken through Computational Wind Engineering (CWE), which uses Computational Fluid Dynamic (CFD) techniques to model a 'virtual wind tunnel' and simulate conditions around the site. This report contains the methodology and results from these simulations.

Wind speed contour plots representing the local wind speed-up ratios are derived from the simulations and combined with a statistical model of the regional wind climate (which accounts for the directional strength and frequency of occurrence of the prevailing regional winds). These wind speed-up ratios are then used in conjunction with the Lawson Criteria (2001) for pedestrian wind comfort and safety.

The assessment was carried out in the following configurations:

1) The Proposed Site with Existing Surrounds and Mitigation Treatments

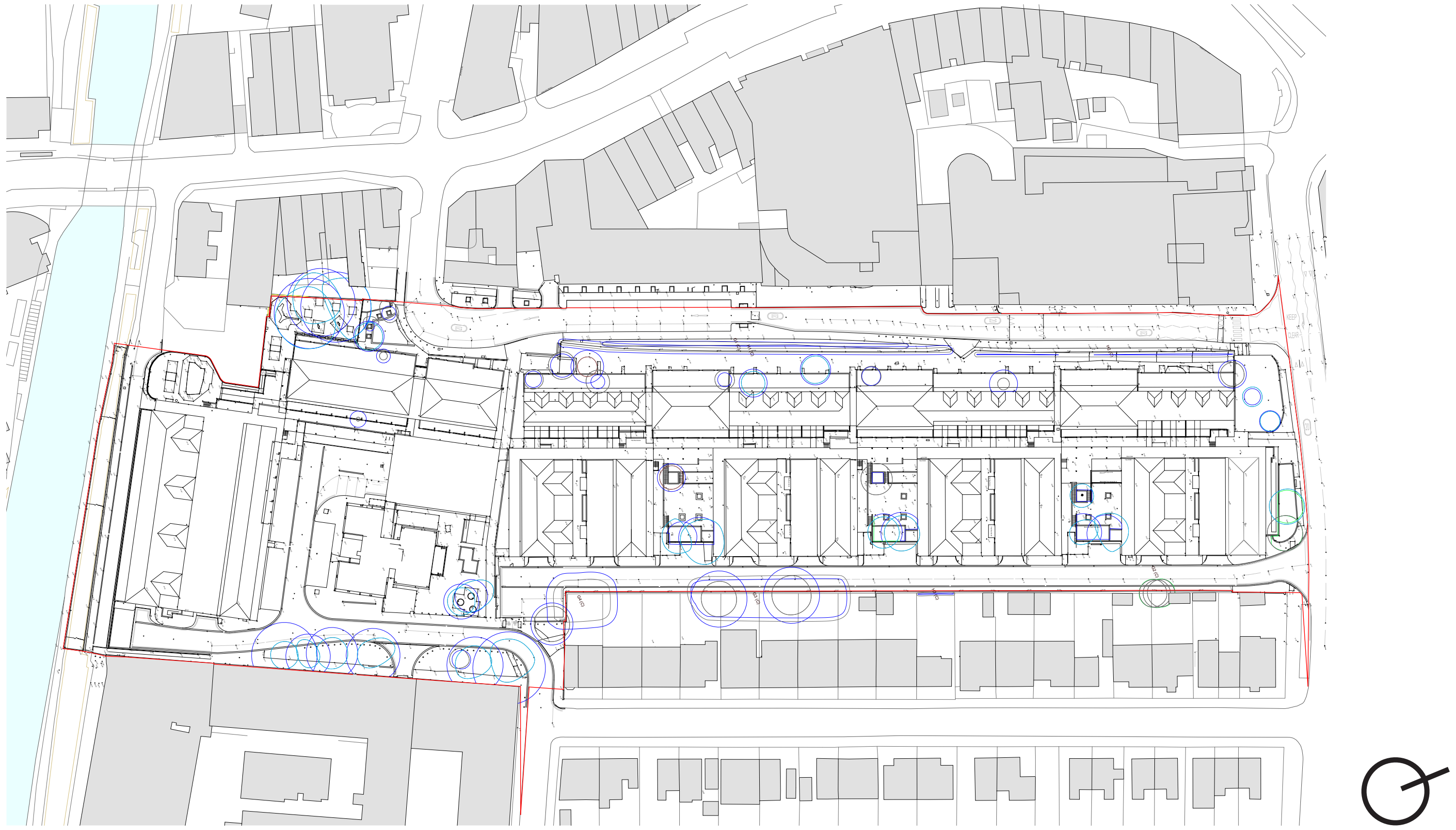


Figure 4. Existing Site

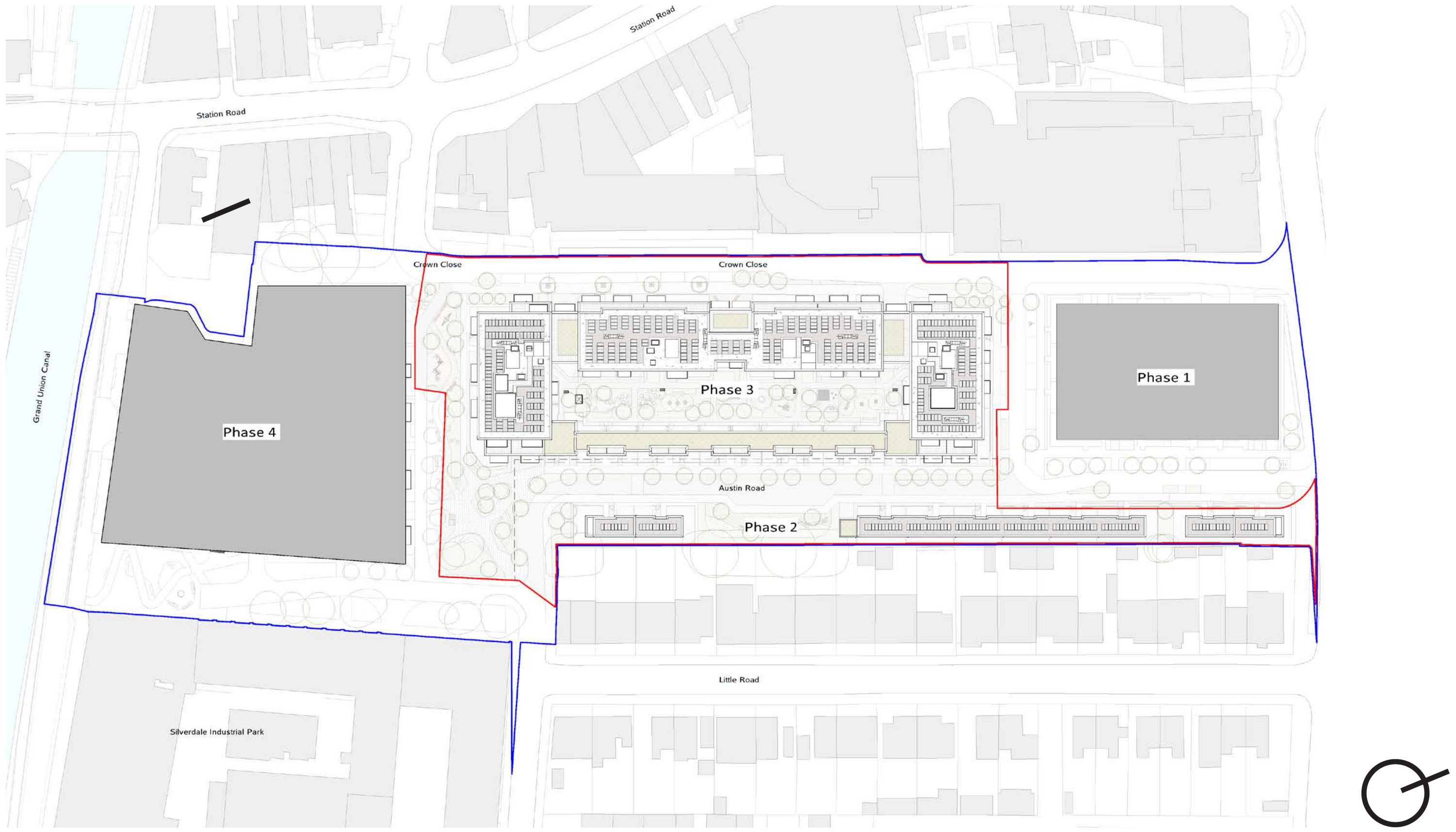


Figure 5. Proposed Site

2. Environmental Wind Speed Criteria

Wind Effects on People

The acceptability of wind in any area is dependent upon its use. For example, people walking or window-shopping will tolerate higher wind speeds than those seated at an outdoor restaurant. Various researchers, such as A.G. Davenport, T.V. Lawson, W.H. Melbourne, A.D. Penwarden, etc., have published criteria for pedestrian comfort in outdoor spaces for various types of activities.

A.D. Penwarden (1975) Criteria for Gust Wind Speeds

The following table developed by A.D. Penwarden (1975) is a modified version of the Beaufort Scale, and describes the effects of various wind intensities on people. Note that the effects column relates to wind conditions that occur frequently (approximately once per week on average). Higher ranges of wind speeds can be tolerated for rarer events.

Type of Winds	Wind	Wind Speed (m/s)	Effect
Calm, light air	1	0-1.5	Calm, no noticable wind
Light breeze	2	1.6-3.3	Wind felt on face
Gentle breeze	3	3.4-5.4	Hair is disturbed, Clothing flaps
Moderate breeze	4	5.5-7.9	Raises dust, dry soil and loose paper. Hair disarranged
Fresh breeze	5	8.0-10.7	Force of wind felt on body
Strong breeze	6	10.8-13.8	Umbrellas used with difficulty, hair blows straight, difficult to walk steadily. Wind noise on ears unpleasant
Near gale	7	13.9-17.1	Inconvenience felt when walking
Gale	8	17.2-20.7	Generally impeedes progress. Great difficulty with balance
Strong gale	9	20.8-24.4	People blown over by gusts

Table 1. Summary of Wind Effects on People (A.D. Penwarden, 1975)

T.V. Lawson Criteria for Mean Wind Speeds

In 1973, T.V. Lawson quotes that A.D. Penwarden's Beaufort 4 (as listed in Table 1) would be acceptable if it is not exceeded for more than 4% of the time; and Beaufort 6 would be unacceptable if it is exceeded more than 2% of the time. Later, in 1975, T.V. Lawson presented a set of criteria very similar to those of A.G. Davenport's. These are presented in Tables 2 and 3.

Classification	Activities	Annual Maximum Mean
Safety (all weather areas)	Accessible by the general public	15m/s
Safety (fair weather areas)	Private outdoor areas (balconies, terraces etc.)	20m/s

Table 2. Safety Criteria by T.V. Lawson (1975)

Classification	Activities	95th Percentile Maximum Mean (approx once per week)
Business Walking	Objective walking from A to B	8m/s < V < 10m/s
Pedestrian Walking	Slow walking etc.	6m/s < V 8m/s
Short Exposure Activities	Pedestrian standing or sitting for short times	4m/s < V < 6m/s
Long Exposure Activities	Pedestrian sitting for a long duration	V < 4m/s

Table 3. Comfort Criteria by T.V. Lawson (1975)

T.V. Lawson (1980) presented a further set of criteria that has been widely adopted in the UK. These criteria are based on Beaufort scale levels and have a variable probability of exceedance. These criteria are based on mean wind speeds and are outlined in Table 4 below.

Classification	Human Activities	Percentage of Exceedance and Beaufort Scale
Roads and Carparks	Difficult to walk steadily	2% > Beaufort 6
Business Walking	Unacceptable as main public access ways	2% > Beaufort 5
Pedestrian Walking	Acceptable for walking, main public access ways	4% > Beaufort 4
Sitting	Generally acceptable for walking & short duration stationary activities such as window-shopping, standing or sitting in plazas	6% > Beaufort 3

Table 4. Comfort Criteria by T.V. Lawson (1980)

Wind Speed Criteria Used for this Study

For this study, the measured wind conditions for the various critical outdoor trafficable areas within and around the proposed development are compared against the Lawson Criteria (2001).

These criteria were firstly developed by Tom Lawson, who was a Professor of Industrial Aerodynamics at Bristol University, and have been widely adopted by planning authorities in the UK. The 2001 Lawson Criteria comprise both comfort and safety criteria. The comfort criteria sets out distinct pedestrian activities, with less active pursuits requiring more benign wind conditions (see Appendix C for inteneded seasonal pedestrian activities in specific areas); while the safety criteria relate to the wind speed at which a person is likely to be blown over. The comfort and safety criteria have been provided in Tables 5 and 6.

Within the following report the safety and comfort conditions are presented using the colour-coded diagrams in Figure 6.

Classification	Activities	Mean and GEM wind speed (5% exceedance)
Sitting	Acceptable for outdoor sitting use, e.g. restaurant or cafe	< 4.0m/s
Standing	Acceptable for entrances, bus stops, covered walkways or passageways	< 6.0m/s
Strolling	Acceptable for external pavements or walkways for leisure use	< 8.0m/s
Business Walking	Acceptable for external pavements or walkways for locomotion only	< 10.0m/s
Uncomfortable	Not comfortable for regular pedestrian access	> 10.0m/s

Table 5. Lawson Comfort Criteria (2001)

Classification	Activities	Mean and GEM wind speed (0.023% exceedance)
Unsafe Frail	Presents a safety risk, especially to more vulnerable members of the public	15m/s
Unsafe All	Presents a safety risk to all members of the public	20m/s

Table 6. Lawson Safety Criteria (2001)

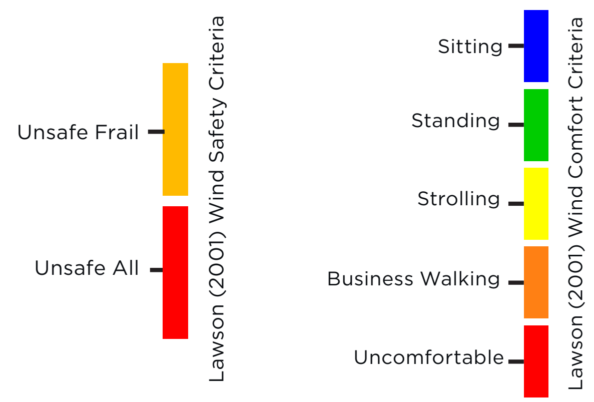


Figure 6. Lawson Contours

3. CFD Methodology

Numerical Setup

The numerical modelling was conducted using the HELYX 3.4.0 computational package. A detailed wind driven flow simulation was conducted in order to assess the wind speeds throughout the lobby space. The characteristics of the CFD simulation are detailed in Table 7 below.

Solver	Coupled
Formulation	Implicit
Time	Steady
Operating Conditions	Pressure
Viscous Model	Realizable K-Epsilon (2 Equation) Standard Wall Functions
Pressure-Velocity Coupling	Coupled
Discretization	Pressure (Standard) Momentum (Second Order Upwind)
Boundary Conditions	Velocity Normal Inlet Outlets
Under Relaxation Factors	0.4 for the pressure 0.7 for momentum
Residuals	0.001 for Continuity, Momentum, K, Epsilon Equations

Table 7. CFD Simulation Setup

Boundary Conditions

The wind velocity inside and outside the development was evaluated by solving the Reynolds' Averaged Navier Stokes (RANS) equations for the flow. A cylindrical computational domain with a height of 200 meters and a radius of 475 meters was generated, as shown in Figures 7 and 8. The side walls of the computational domain were used as the computed inlet and outlet for the boundary layer input. 16 wind directions were analysed across the seasonal cases for this study for each site configuration.

Computational Mesh and Grid Independence Study

A grid independence study was undertaken for the external wind speeds of the computational model, for the Southerly wind case. Results from the two grids employed (G1 & G2) were measured at chosen located for various heights. These included y=10m, y=22.5m as well as y=30m. The grid properties and grid independence results are summarised in Tables 8 and 9. G1 was chosen for simulation in order to maximise computational efficiency.

Grid	Element	Base Mesh Size (m)	Cell Count (x10E6)
G1	Hexahedral	0.28	31.7
G2	Hexahedral	0.32	37.3

Table 8. Grid Properties

Grid	G1 Velocity Magnitude (m/s)	G2 Velocity Magnitude (m/s)	Percentage Difference (%)
G1	3.53	3.59	-1.78
G2	5.33	5.28	-1.05

Table 9. Grid Independence Results

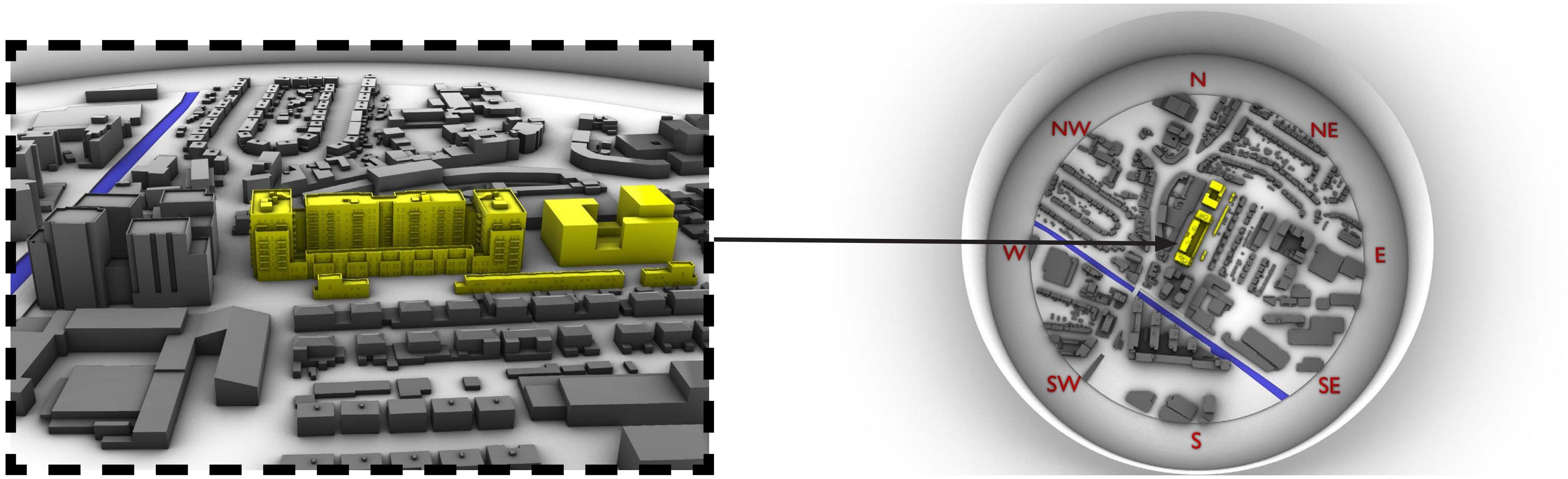


Figure 7. Computational Domain (Proposed Site with Existing Surrounds and Mitigation Treatments)

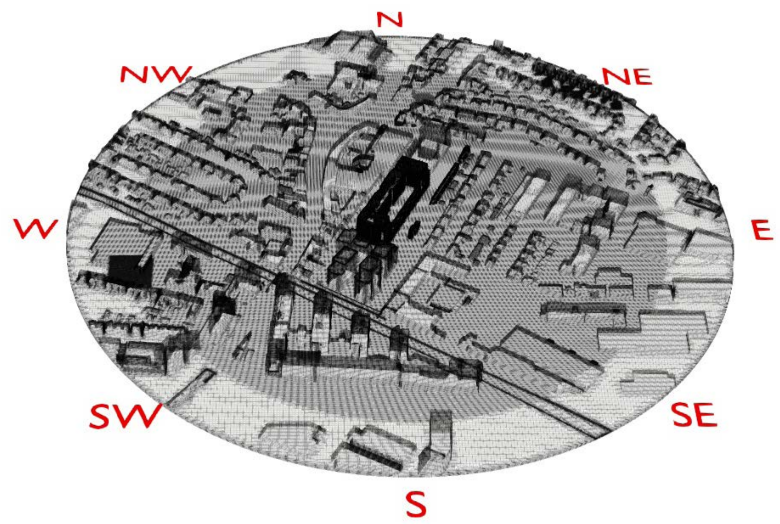


Figure 8. Computational Grid (Proposed Site with Existing Surrounds and Mitigation Treatments)

4. Meteorological Data for London

Meteorological Data

Details of the wind climate for the London region have been determined from a detailed statistical analysis of measured mean wind speed data from meteorological stations in Heathrow, Stansted and Gatwick aiports. 136 years of wind climate data has been collected from these stations and the data has been corrected so that it represents winds over standard open terrain at a height of 10m above ground. The directional wind speeds and the directional frequency of occurrences of the regional winds are provided in Table 10 and shown in Figures 9 and 10. The data indicates that the maximum wind speeds for the region are from the south-west and that the most frequent winds are also from the south-west.

Wind Direction	Daily Average Mean Wind Speeds (m/s)	Weekly (5%) Wind Speeds (GEM) (m/s)	1 Year Wind Speeds (PEAK) (m/s)	% of all observations
N	4.3	5.9	9.4	5.2
NNE	4.5	6.2	9.5	5.3
NE	4.8	6.5	9.5	5.1
ENE	4.4	6.1	9.4	5.0
E	4.3	5.5	8.8	4.2
ESE	4.2	4.8	8.1	3.2
SE	4.1	4.6	8.0	3.3
SSE	4.2	5.1	8.9	4.0
S	4.6	6.9	10.5	6.4
SSW	5.0	8.3	11.6	10.5
SW	5.1	8.9	12.2	13.4
WSW	5.0	8.2	11.8	10.1
W	4.8	7.6	11.4	8.4
WNW	4.5	6.5	10.5	5.8
NW	4.3	6.0	9.8	5.2
NNW	4.2	5.8	9.4	4.9

Table 10. Wind Speeds and Frequencies of Occurrence for the London Region

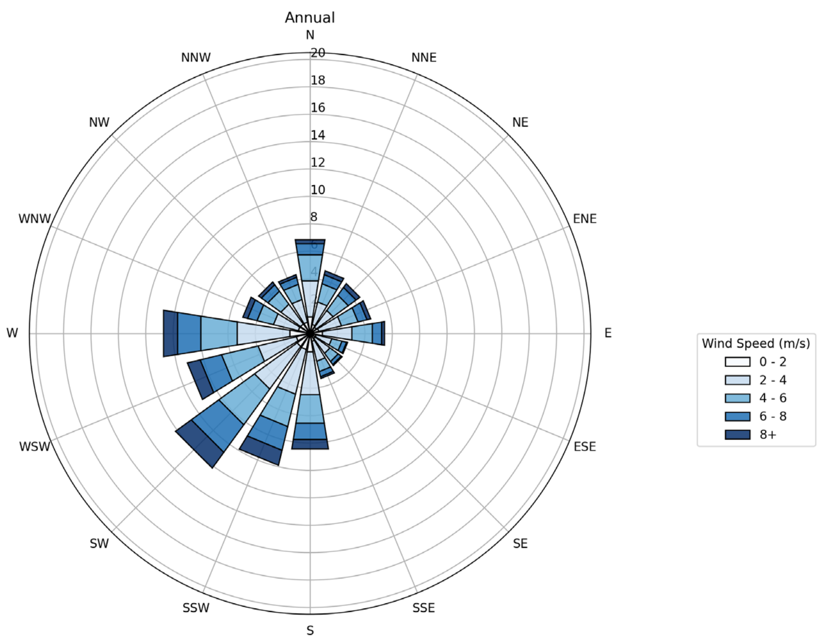


Figure 9. Wind Speeds and Frequencies of Occurrence for the London Region (corrected to open terrain at 10m)

Approaching Wind Speeds

The approaching wind terrain category was assessed using the terrain descriptions from Eurocode 1: Actions on Structures – Part 1-4: General Actions-Wind Actions (BS EN 1991-1-4:2005) and International Standard Wind Actions on structure (ISO 4354). For each wind direction, the approaching terrain profiles were combined with the local wind climate to determine the site wind speeds. The site wind speeds and terrain categories are presented in Table 11 for a selection of wind directions. The site wind speeds are used to determine the inputs conditions for the CFD simulations. The site hourly mean wind speeds are used when determining the speedup ratio for a given wind direction, a speed up ratio of zero implies no speed up compared to the boundary condition whereas a speed up ratio of one predicts the wind speed at a point is 100% that of the inlet condition.

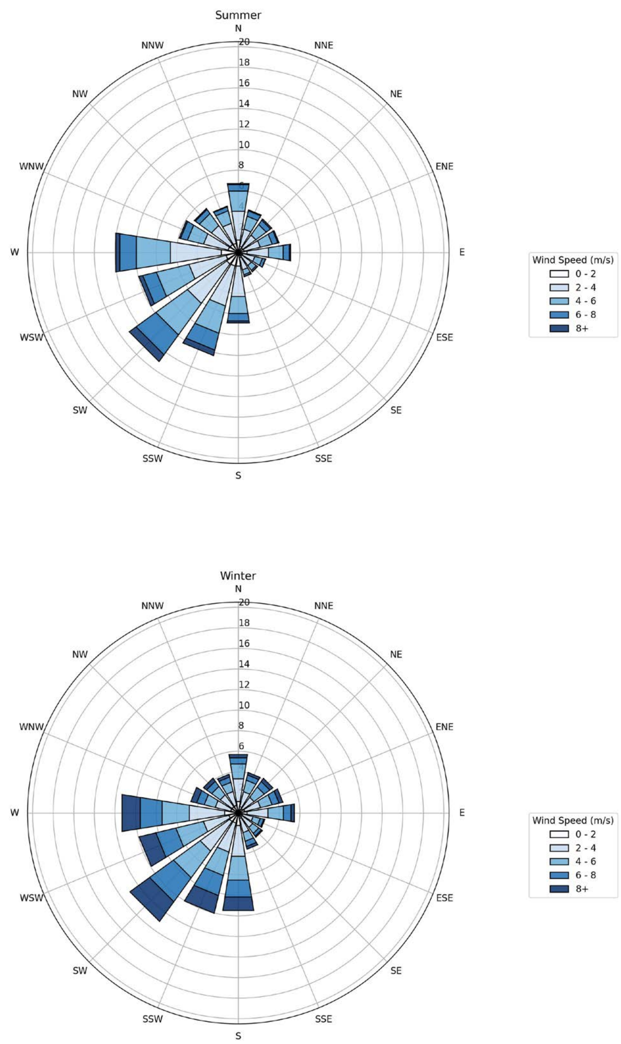


Figure 10. Summer (top) and Winter (bottom) Wind Speeds and Frequencies of Occurrence for the London Region (corrected to open terrain at 10m)

Wind Direction	Terrain Category (EN 1991-1-4, ISO 4354)	Basic Hourly Mean Wind Speed at 10m Height (m/s)	Site Hourly Mean Wind Speed at 10m Height (m/s)
SSW	III	8.3	6.49
SW	III	8.9	6.72
WSW	III	8.2	6.11

Table 11. Hourly Mean Site Wind Speeds

5. Results and Discussion
Annual Safety Contours

The Annual Safety Contours are shown in Figure 11.

Observations

- The wind conditions are safe at ground level.

Figure 11. Lawson Safety Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Annual Condition

5. Results and Discussion
Annual Safety Contours

The Annual Safety Contours for the elevated levels are shown in Figures 12 and 13.

Observations

- The wind conditions on the elevated levels are safe.

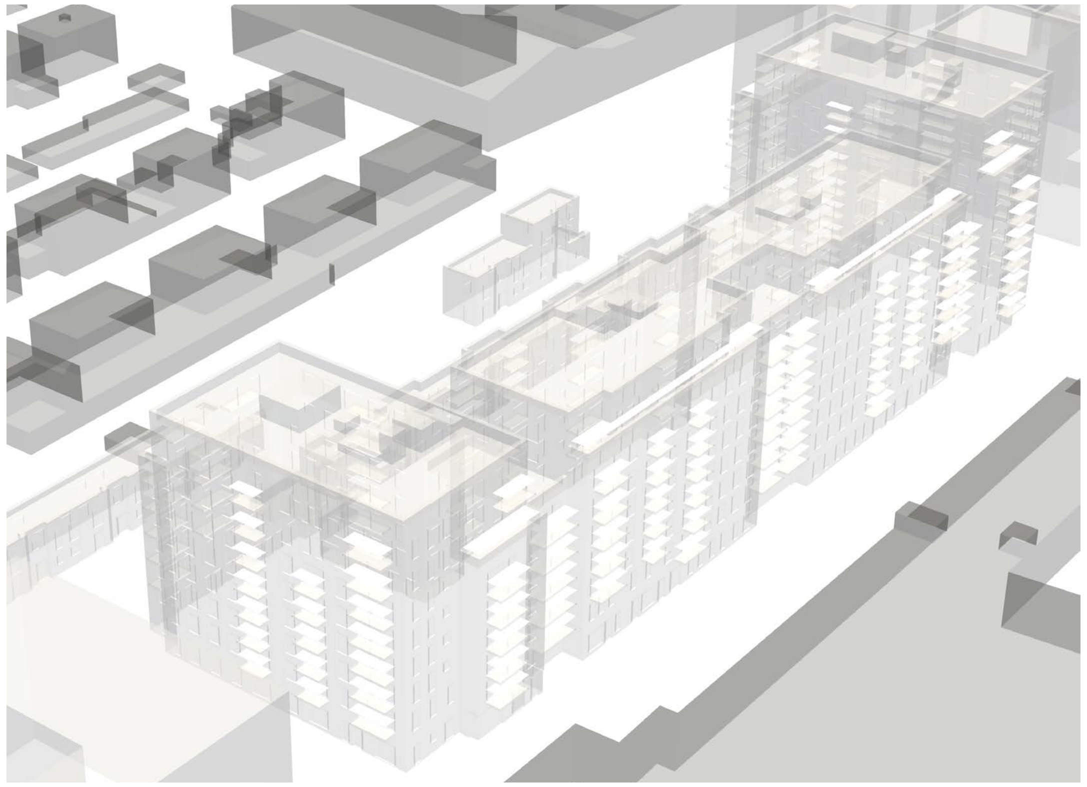


Figure 12. Lawson Safety Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Annual Condition, Northern Aspect

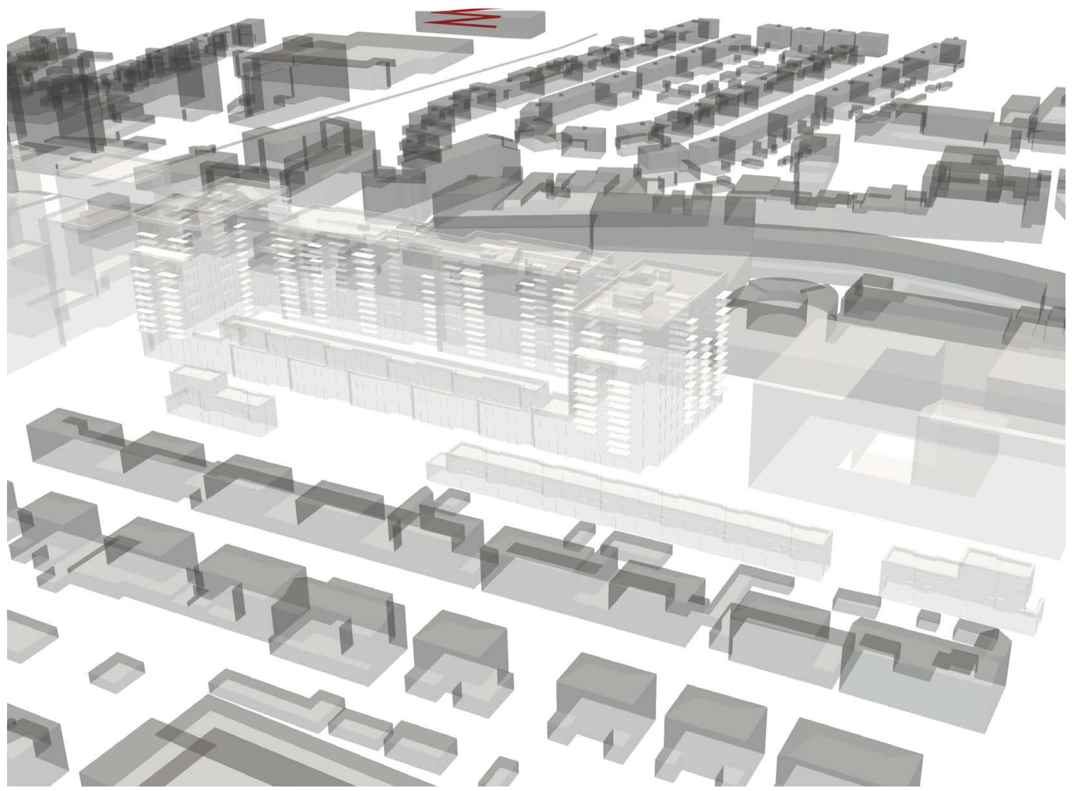


Figure 13. Lawson Safety Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Annual Condition, Eastern Aspect

5. Results and Discussion
Annual Safety Contours

The Annual Safety Contours for the elevated levels are shown in Figures 14 and 15.

Observations

- The wind conditions on the elevated levels are safe.

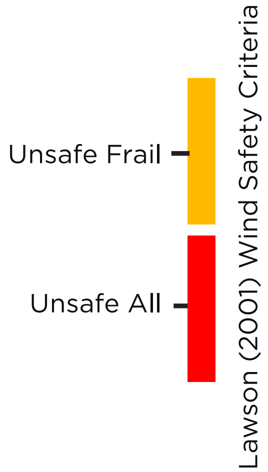


Figure 14. Lawson Safety Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Annual Condition, Southern Aspect

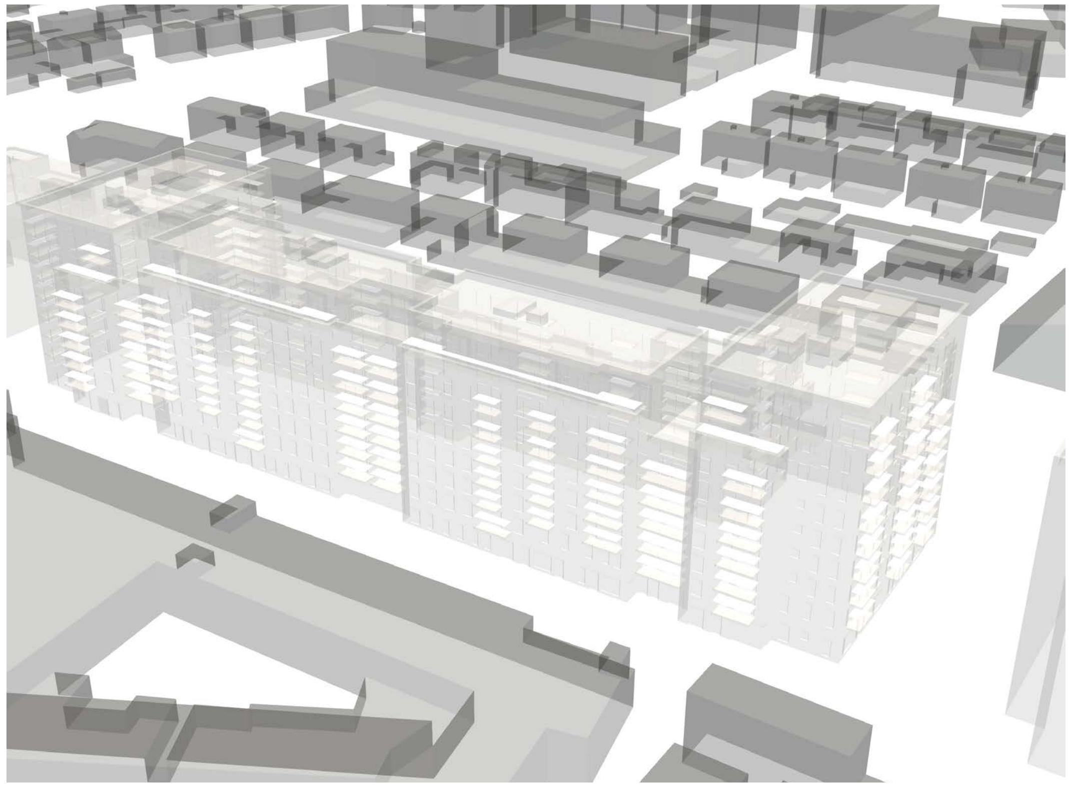


Figure 15. Lawson Safety Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Annual Condition, Western Aspect

WINDTECH

5. Results and Discussion
Winter Comfort Contours

The Winter Comfort Contours are shown in Figures 16.

Observations

- At the ground level, the key intended uses during the Winter are Standing at entrances, Strolling along thoroughfares, and Business Walking along roads.
- At the ground level, the wind conditions are suitable for the intended use in many areas within the site boundary. However, there is a minor exceedance where the wind conditions are unsuitable for intended use on a single entrance on the southern facade of phase 1.

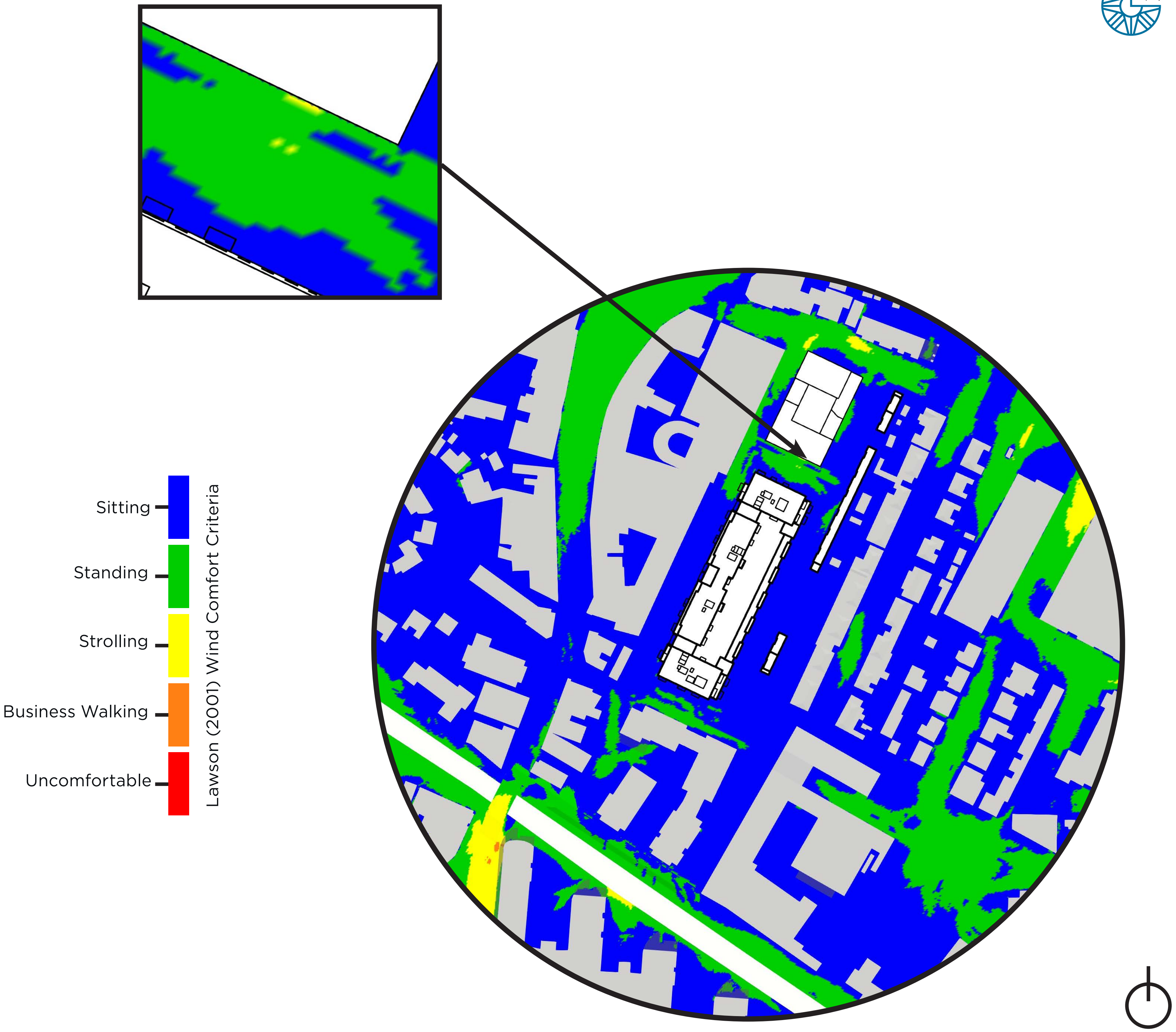


Figure 16. Lawson Comfort Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Winter Condition

5. Results and Discussion
Summer Comfort Contours

The Summer Comfort Contours are shown in Figure 17.

Observations

- At the ground level, the key intended uses during the Summer are Sitting in outdoor seating areas and Standing in amenity areas.
- At ground level, the wind conditions are suitable for intended use in all areas.

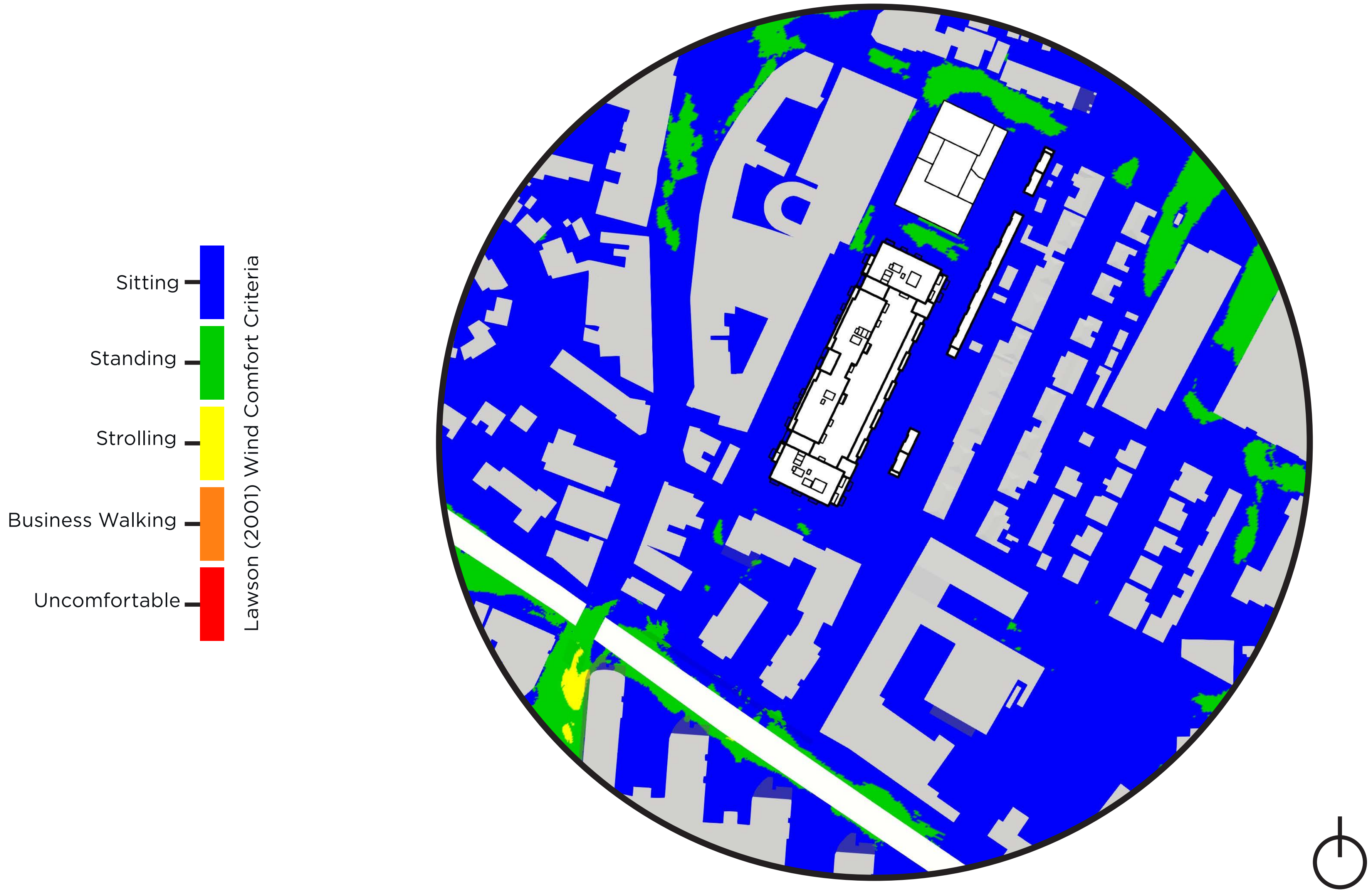


Figure 17. Lawson Comfort Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Summer Condition

5. Results and Discussion
Summer Comfort Contours

The Summer Comfort Contours for the elevated levels are shown in Figures 18 and 19.

Observations

- On the elevated levels, the key intended uses during the Summer are Sitting in outdoor seating areas, Standing in amenity areas accessible to the public/occupants and Standing on balconies.
- The wind conditions on the elevated levels are suitable for the intended uses in all areas.

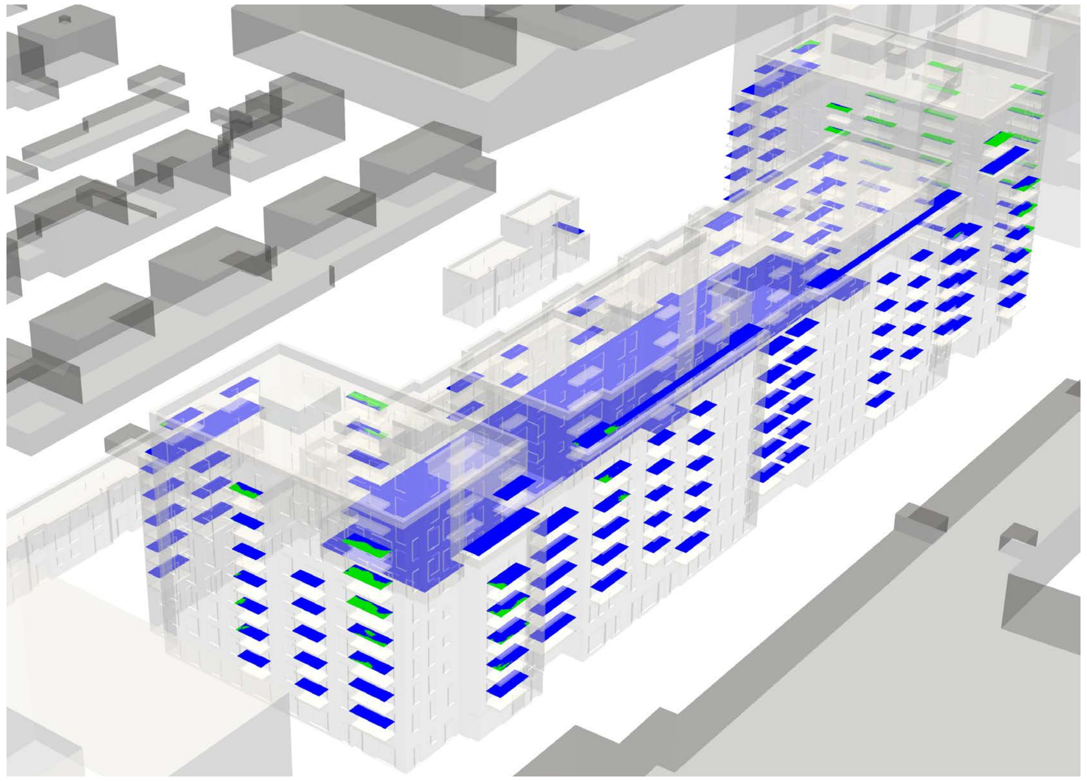


Figure 18. Lawson Comfort Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Summer Condition, Northern Aspect

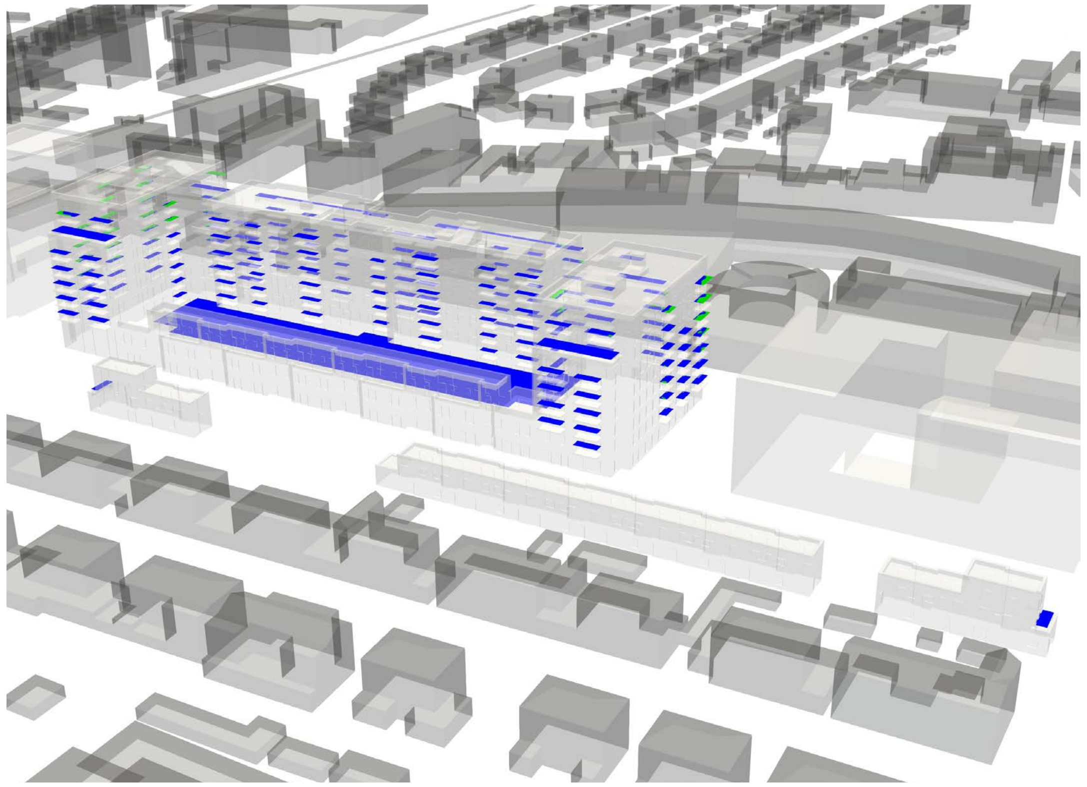


Figure 19. Lawson Comfort Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Summer Condition, Eastern Aspect

5. Results and Discussion
Summer Comfort Contours

The Summer Comfort Contours for the elevated levels are shown in Figures 20 and 21.

Observations

- On the elevated levels, the key intended uses during the Summer are Sitting in outdoor seating areas, Standing in amenity areas accessible to the public/occupants and Standing on balconies.
- The wind conditions on the elevated levels are suitable for the intended uses in all areas.

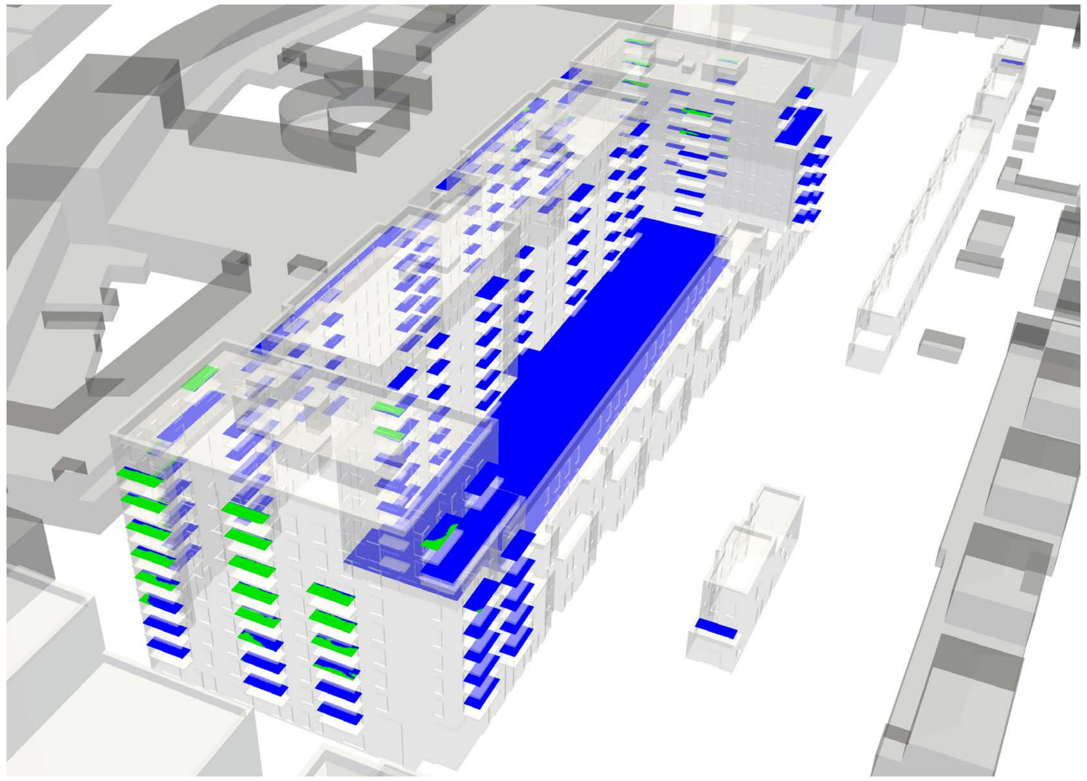


Figure 20. Lawson Comfort Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Summer Condition, Southern Aspect

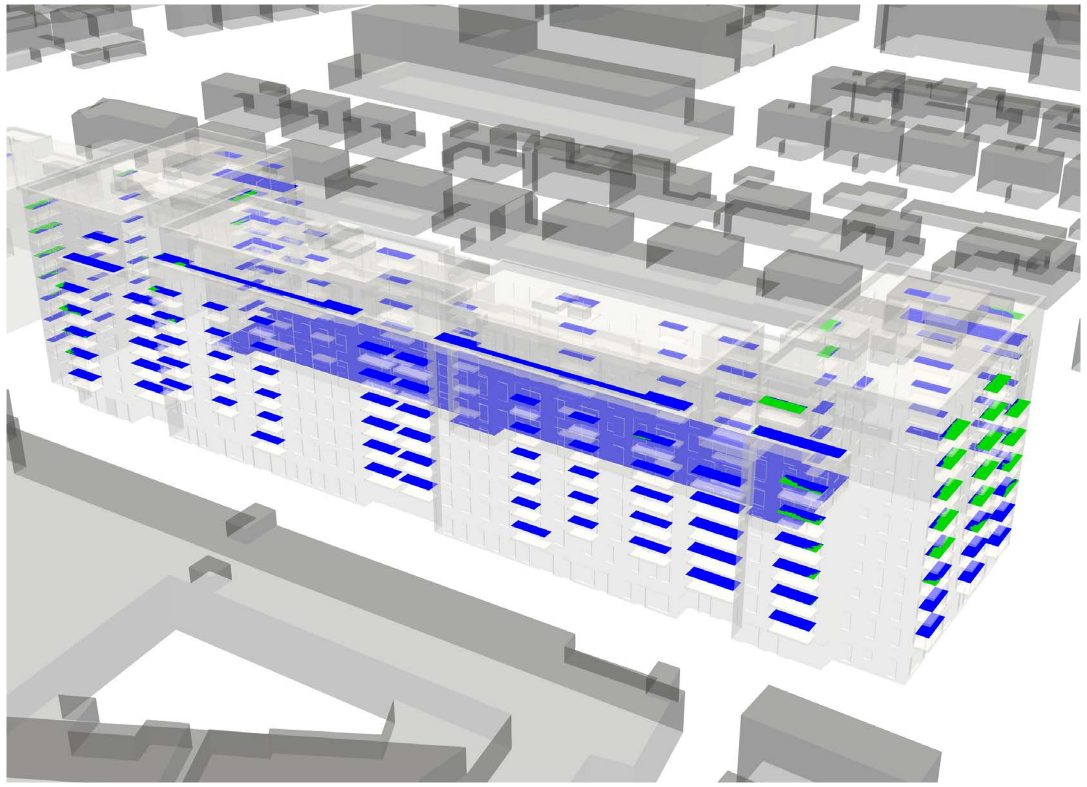


Figure 21. Lawson Comfort Contours, Proposed Site with Existing Surrounds and Mitigation Treatments, Summer Condition, Western Aspect

6. Summary and Recommendations

In light of the assessment results, the following conclusions can be inferred:

- The results of the assessment show that the wind conditions at the ground and elevated levels are safe.
- The results of the assessment also show that the wind conditions at the ground are suitable for the intended use in many areas. However, there is a minor exceedance where the wind conditions are unsuitable for intended use on a single entrance on the southern facade of phase 1.
- The results of the assessment also show that the wind conditions at the elevated levels are suitable for the intended use in all areas.

For areas where the wind conditions are unsuitable for the intended use, it is recommended that mitigation measures are implemented.

Figures 22 and 23 show the recommended mitigation treatments, a 0.2m high hedge extension designed to alleviate adverse wind conditions at the unsuitable entrance on phase 1.

0.2m High Hedge Extension

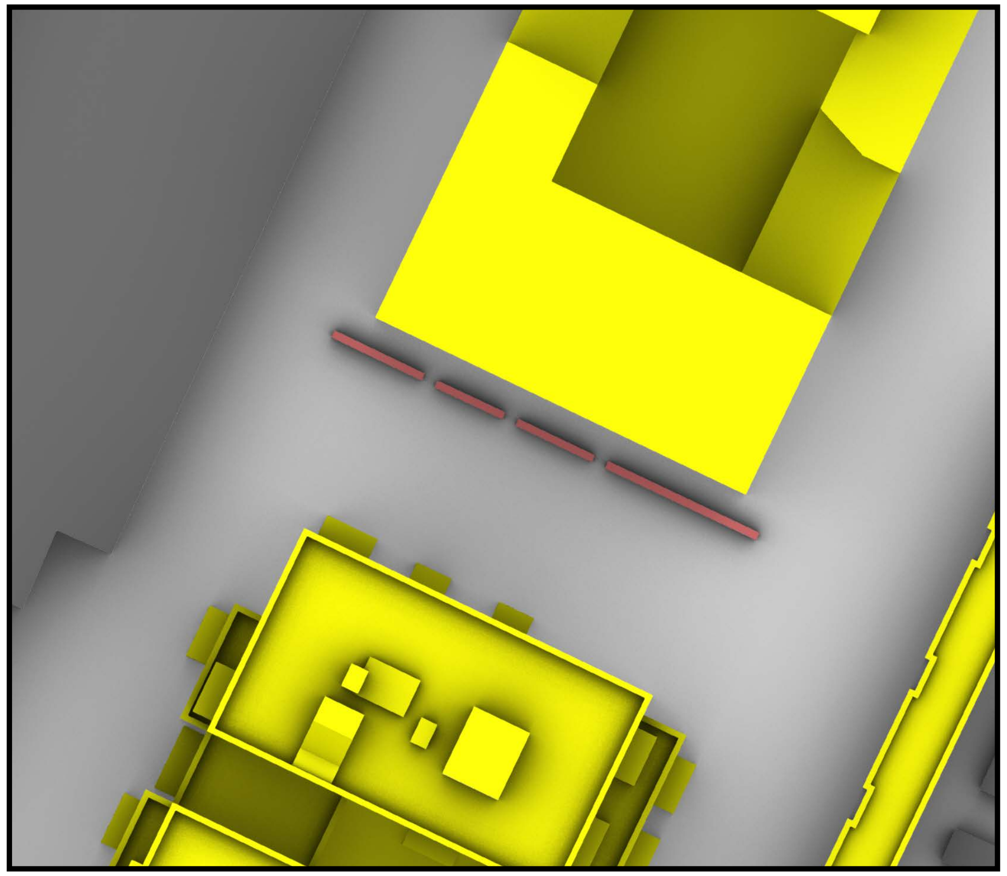


Figure 22. Recommended Mitigation Treatments, Plan View

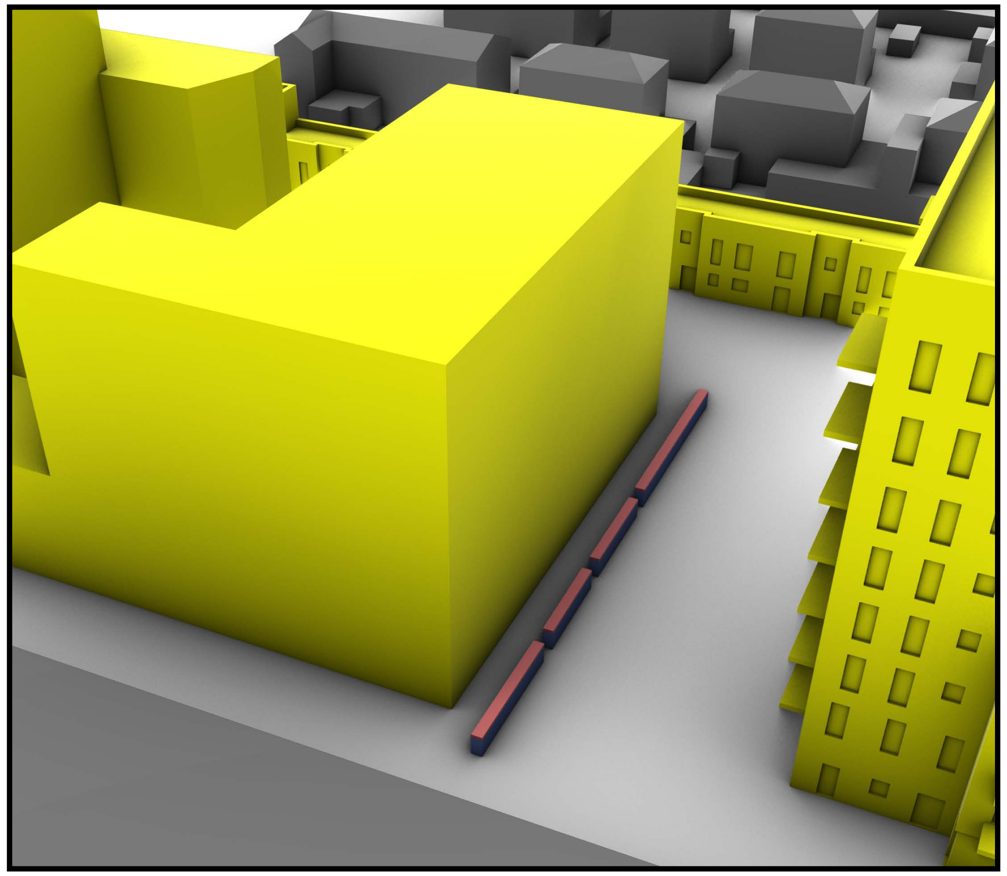


Figure 23. Recommended Mitigation Treatments, North-Western Aspect

7. References

1. Australian and New Zealand Standard, AS/NZS1170.2:2011, “Structural Design Actions”
2. Aynsley, R.M., Melbourne, W., Vickery, B.J., 1977, “Architectural Aerodynamics”, Applied Science Publishers.
3. Davenport, A.G., 1972, “An approach to human comfort criteria for environmental conditions”, Colloquium on Building Climatology, Stockholm.
4. Davenport, A.G., 1977, “The prediction of risk under wind loading”, 2nd International Conference on Structural Safety and Reliability, September 19-21, 1977, Munich, Germany, pp. 511-538.
5. Deaves, D. M. and Harris, R. I. 1978, “A mathematical model of the structure of strong winds.” Construction Industry and Research Association (U.K), Report 76.
6. International Organisation for Standardisation, ISO4354:2009, “Wind Actions on Structures”.
7. Lawson, T.V., 1973, “The wind environment of buildings: a logical approach to the establishment of criteria”, Bristol University, Department of Aeronautical Engineering.
8. Lawson, T.V., 1975, “The determination of the wind environment of a building complex before construction”, Bristol University, Department of Aeronautical Engineering.
9. Lawson, T.V., 1980, “Wind Effects on Buildings - Volume 1, Design Applications”, Applied Science Publishers Ltd, Ripple Road, Barking, Essex, England.
10. Melbourne, W.H., 1978, “Criteria for Environmental Wind Conditions”, Journal of Wind Engineering and Industrial Aerodynamics, vol.3, pp.241-249.
11. Melbourne, W.H., 1978, “Wind Environment Studies in Australia”, Journal of Wind Engineering and Industrial Aerodynamics, vol.3, pp.201-214.
12. Penwarden, A.D., and Wise A.F.E., 1975, “Wind Environment Around Buildings”, Building Research Establishment Report, London.
13. Rofail, A.W., 2007, “Comparison of Wind Environment Criteria against Field Observations”, 12th International Conference of Wind Engineering (Volume 2), Cairns, Australia

Appendix A

Wind Effects Glossary

Appendix A - Wind Effects Glossary

A.1 Downwash and Upwash Effects

The downwash wind effect occurs when wind is deflected down the windward face of a building, causing accelerated winds at pedestrian level. This can lead to other adverse effects as corner acceleration as the wind attempts to flow around the building, as seen in Figure A.1.

This can also lead to recirculating flow in the presence of a shorter upstream building, causing local ground level winds to move back into the prevailing wind.

The upwash effect occurs near upper level edge of a building form as the wind flows over the top of the building. This has the potential to cause acceleration of winds near the leading edge, as well as potentially reattaching onto the roof area. This effect causes wind issues particularly near the leading edges of tall building and on the rooftop areas if there is sufficient depth along the wind direction. Upwash is more apparent in taller towers and podia.

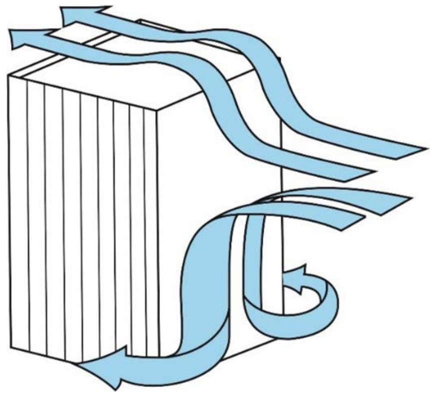


Figure A.1. Downwash Leading to Corner Wind Effect, and Upwash Effects

A.2 Funnelling/Venturi Effect

Funnelling occurs when the wind interacts with two or more buildings which are located adjacent to each other, which results in a bottleneck, as shown in Figure A.2. This causes the wind to be accelerated through the gap between the buildings, resulting in adverse wind conditions and pedestrian discomfort within the constricted space. Funnelling effects are common along pedestrian links and thoroughfares generally located between neighbouring buildings that have moderate gaps between them.

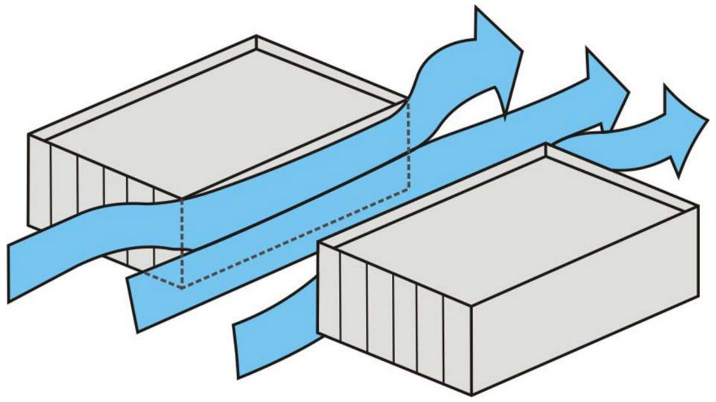


Figure A.2. Funnelling/Venturi Wind Effect

A.3 Gap Effect

The gap effect occurs in small openings in the façade that are open to wind on opposite faces, as seen in Figure A.3. This can involve a combination of funnelling and downwash effects. Presenting a small gap in the façade on the windward aspect as the easiest means through which the wind can flow through can result in wind acceleration through this gap. The pressure difference between the windward façade and the leeward façade also tends to exacerbate the wind flow through this gap.

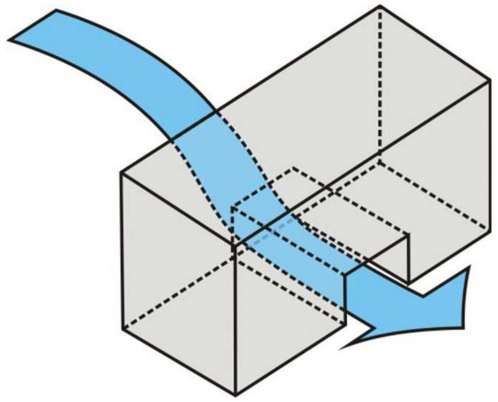


Figure A.3. Gap Wind Effect

A.4 Sidestream and Corner Effects

The sidestream effect is due to a gradual accumulation of wind shearing along the building façade that eventuates in an acceleration corner effect. The flow is parallel to the façade and can be exacerbated by downwash effects as well, or due to corner effect winds reattaching on the façade.

This is shown in Figure A.4. The corner refers to the acceleration of wind at the exterior vertical edge of a building, caused by the interaction of a large building massing with the incident wind, with the flow at the corner being accelerated due to high pressure differentials sets up between the windward façade and the orthogonal aspects. It can be further exacerbated by downwash effects that build up as the flow shears down the façade.

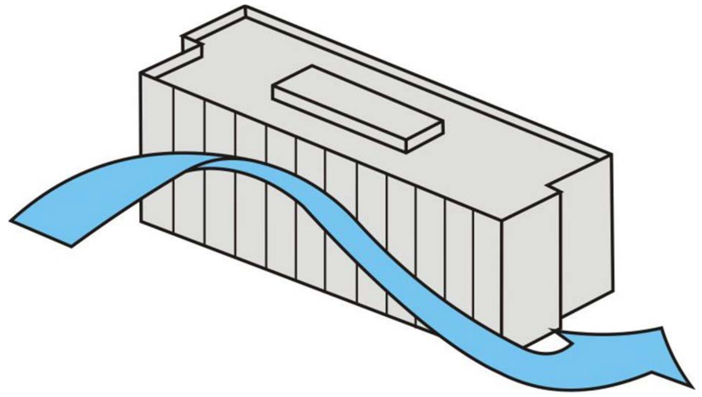


Figure A.4. Sidestream and Corner Wind Effect

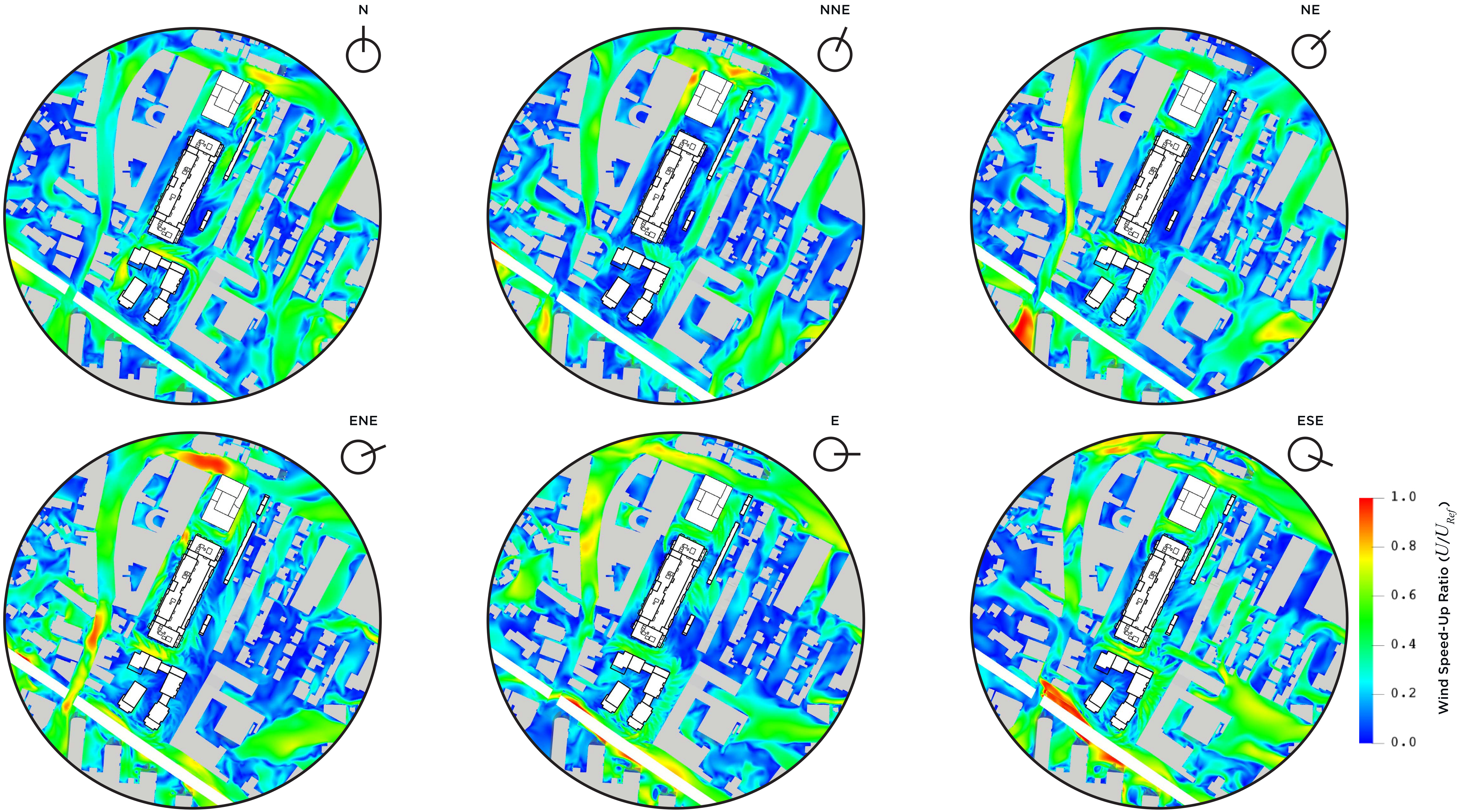
A.5 Stagnation

Stagnation in a region refers to an area where the wind velocity is significantly reduced due to the effect of the flow being impeded by the bluff body. For a particular prevailing wind direction, this is typically located near the middle of the windward face of the building form or over a short distance in front of the windward face of a screen or fence. Concave building shapes tend to create an area of stagnation within the cavity, and wind speeds are generally low in these areas.

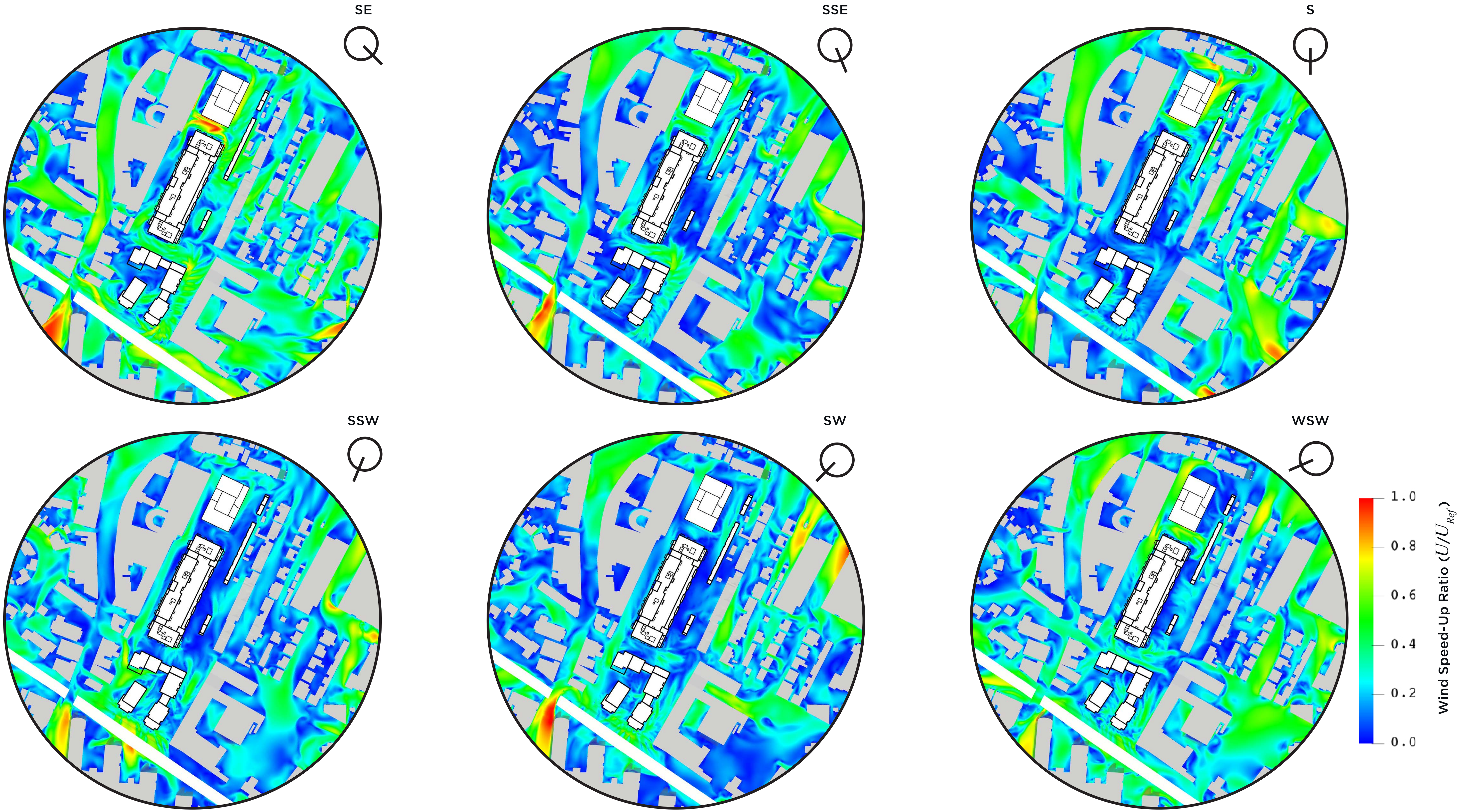
Appendix B

Wind Speed Up Fields

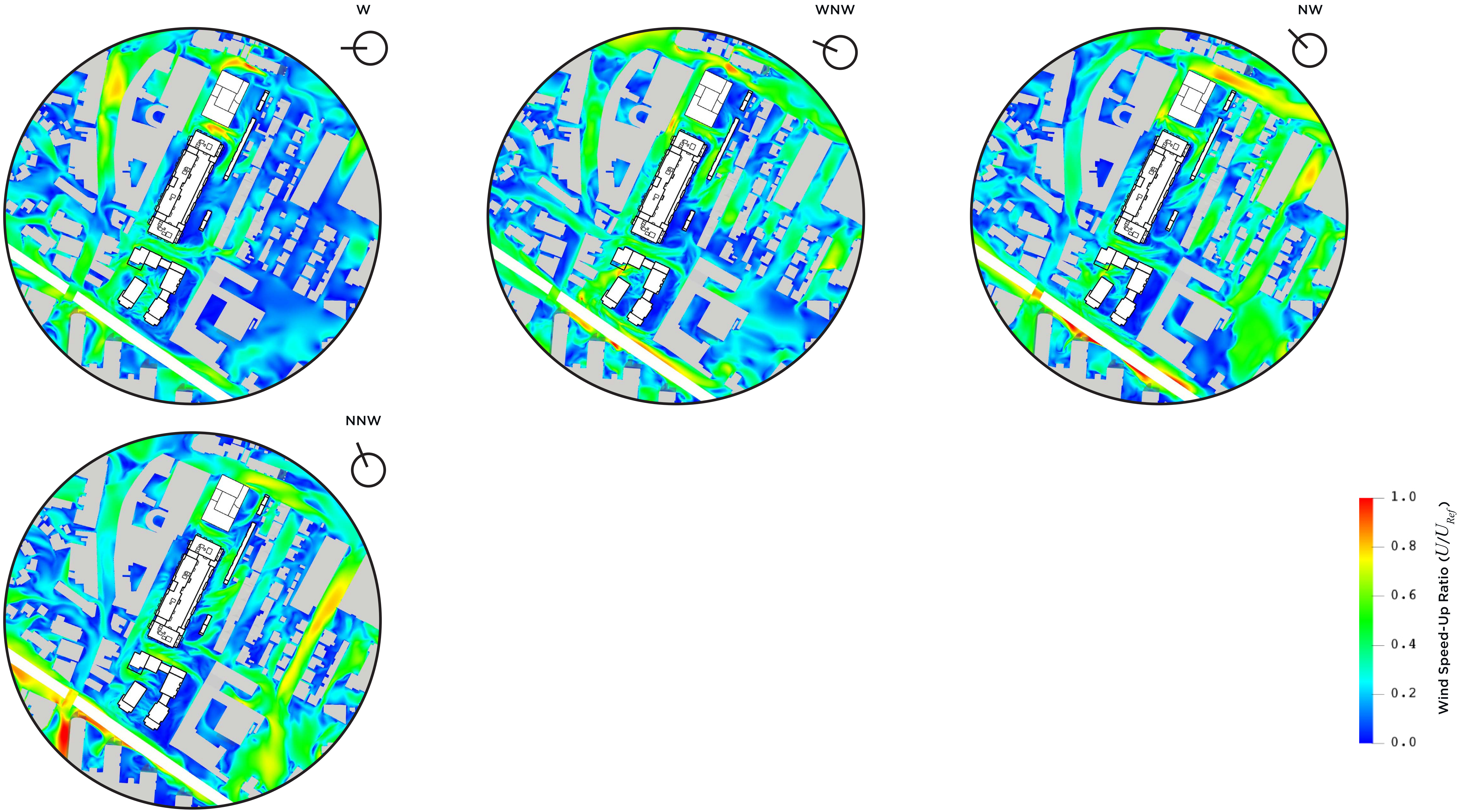
Appendix B - Wind Speed Up Fields - The Proposed Site with Existing Surrounds and Mitigation Treatments



Appendix B - Wind Speed Up Fields - The Proposed Site with Existing Surrounds and Mitigation Treatments



Appendix B - Wind Speed Up Fields - The Proposed Site with Existing Surrounds and Mitigation Treatments



Appendix C

Target Criteria

Appendix C - Comfort Target Criteria

Lawson Criteria 2001	Season for Use	Winter Intended Use	Summer Intended Use
balconies	summer	N/A	Standing
bike racks	winter	Standing	N/A
bus stops	winter	Standing	N/A
elevated areas for workers	winter	Business Walking	N/A
entrances	winter	Standing	N/A
entrances for workers	winter	Business Walking	N/A
general amenity areas	summer	N/A	Standing
off-site bike racks	winter	Standing	N/A
off-site bus stops	winter	Standing	N/A
off-site entrances	winter	Standing	N/A
off-site general amenity areas	summer	N/A	Standing
off-site pedestrian crossings waiting areas	winter	Standing	N/A
off-site play areas	summer	N/A	Standing
off-site railway platforms	winter	Standing	N/A
off-site residential gardens	summer	N/A	Standing
off-site roads	winter	Business Walking	N/A
off-site seating areas	summer	N/A	Sitting
off-site thoroughfares	winter	Strolling	N/A
pedestrian crossing waiting areas	winter	Standing	N/A
play areas	summer	N/A	Standing
podiums	summer	N/A	Standing
residential gardens	summer	N/A	Standing
roads	winter	Business Walking	N/A
seating areas	summer	N/A	Sitting
terraces	summer	N/A	Standing
thoroughfares	winter	Strolling	N/A

Table C.1 Lawson Intended Uses (2001)

Classification	Activities	wind speed (5% exceedance)
Sitting	Acceptable for outdoor sitting use, e.g. restaurant or cafe	< 4.0m/s
Standing	Acceptable for entrances, bus stops, covered walkways or passageways	< 6.0m/s
Strolling	Acceptable for external pavements or walkways for leisure use	< 8.0m/s
Business Walking	Acceptable for external pavements or walkways for locomotion only	< 10.0m/s

Table C.2 Lawson Comfort Criteria (2001)

Appendix D

Tested Mitigation Renders

Appendix D - Tested Mitigation Renders

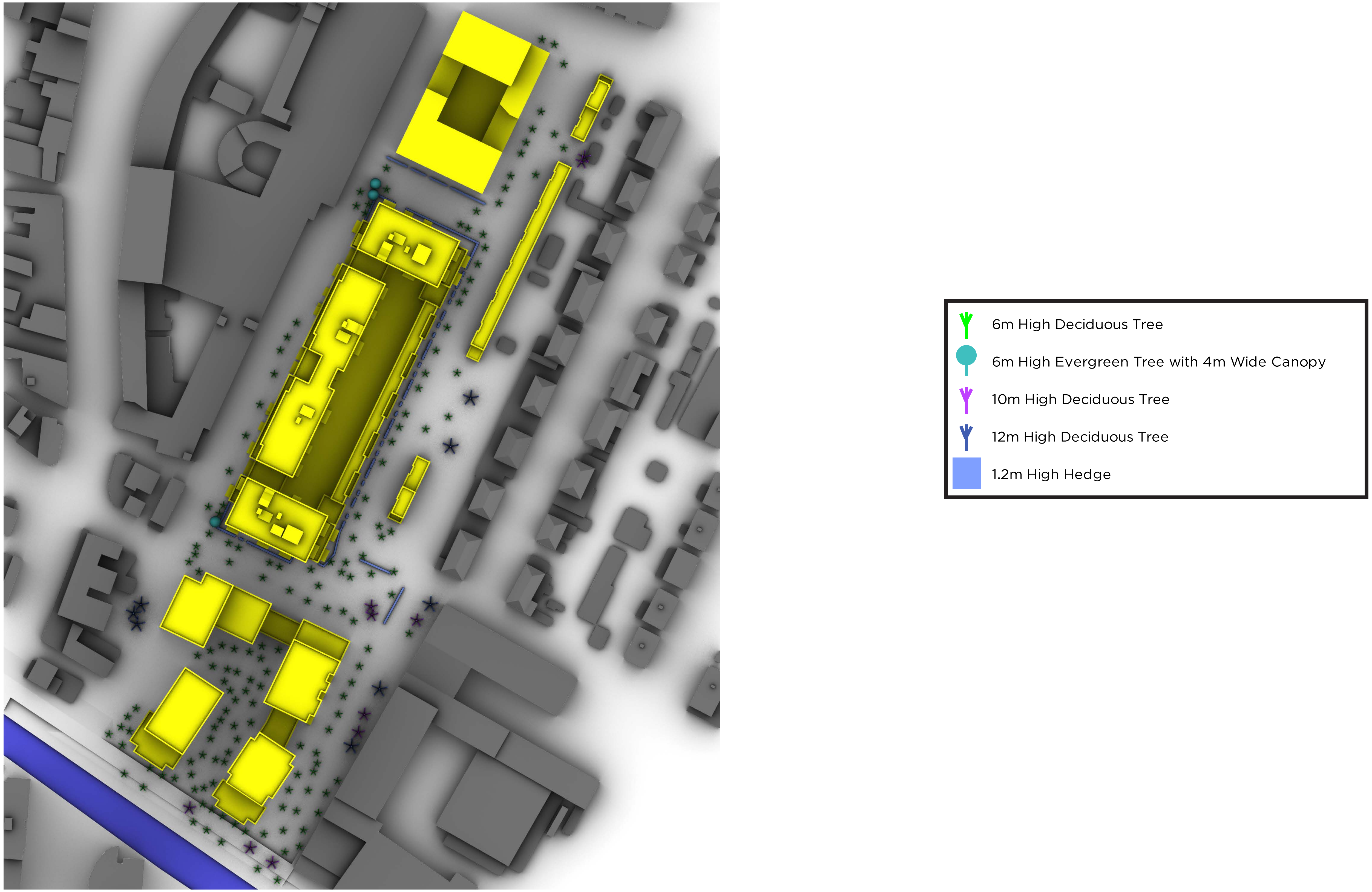


Figure D.1. Tested Mitigation Render - Plan View

Appendix D - Tested Mitigation Renders

- 6m High Deciduous Tree
- 6m High Evergreen Tree with 4m Wide Canopy
- 10m High Deciduous Tree
- 12m High Deciduous Tree
- 1.2m High Hedge

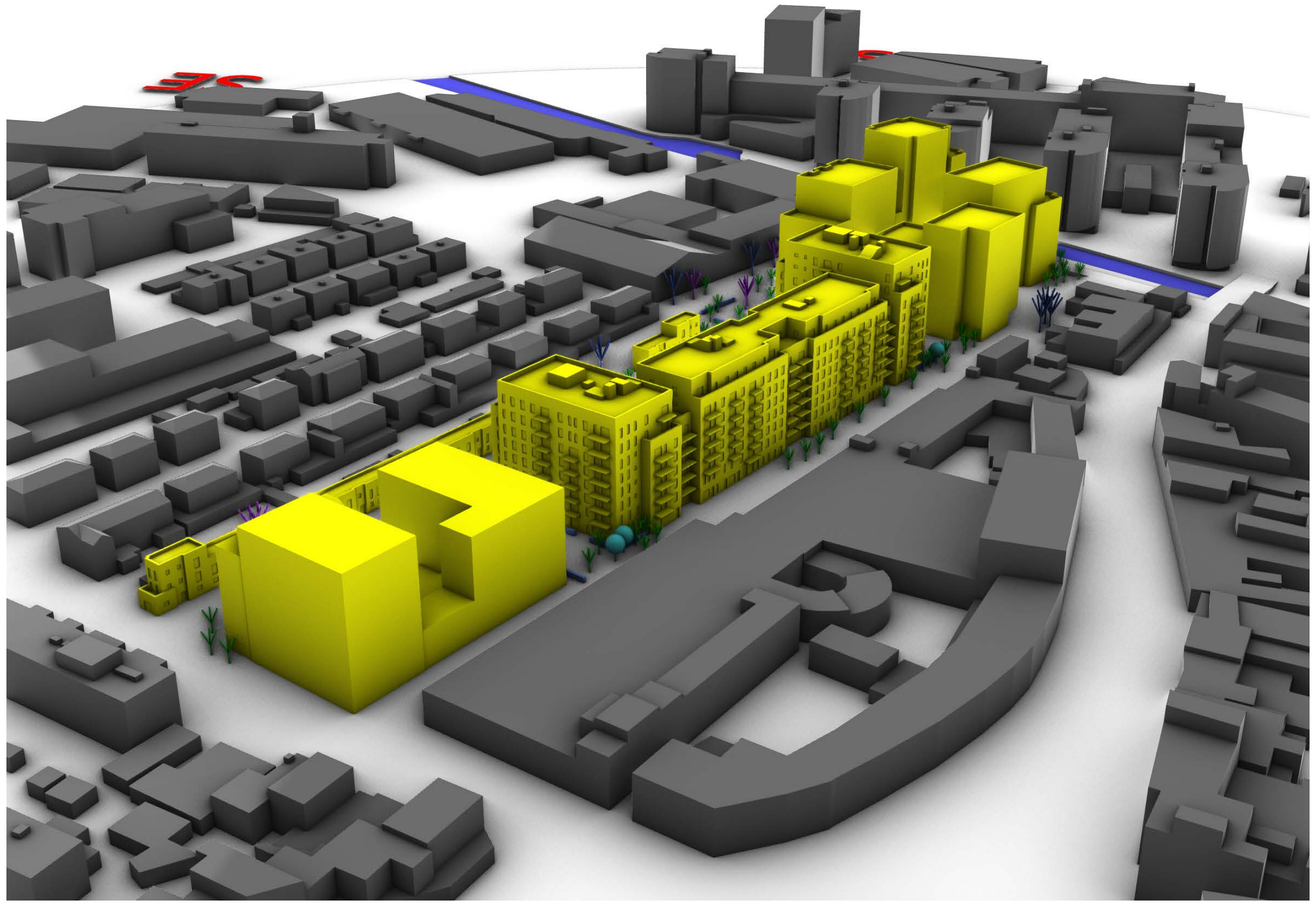


Figure D.2. Tested Mitigation Render - Northern Aspect

Figure D.3. Tested Mitigation Render - Eastern Aspect

Appendix D - Tested Mitigation Renders

6m High Deciduous Tree
6m High Evergreen Tree with 4m Wide Canopy
10m High Deciduous Tree
12m High Deciduous Tree
1.2m High Hedge

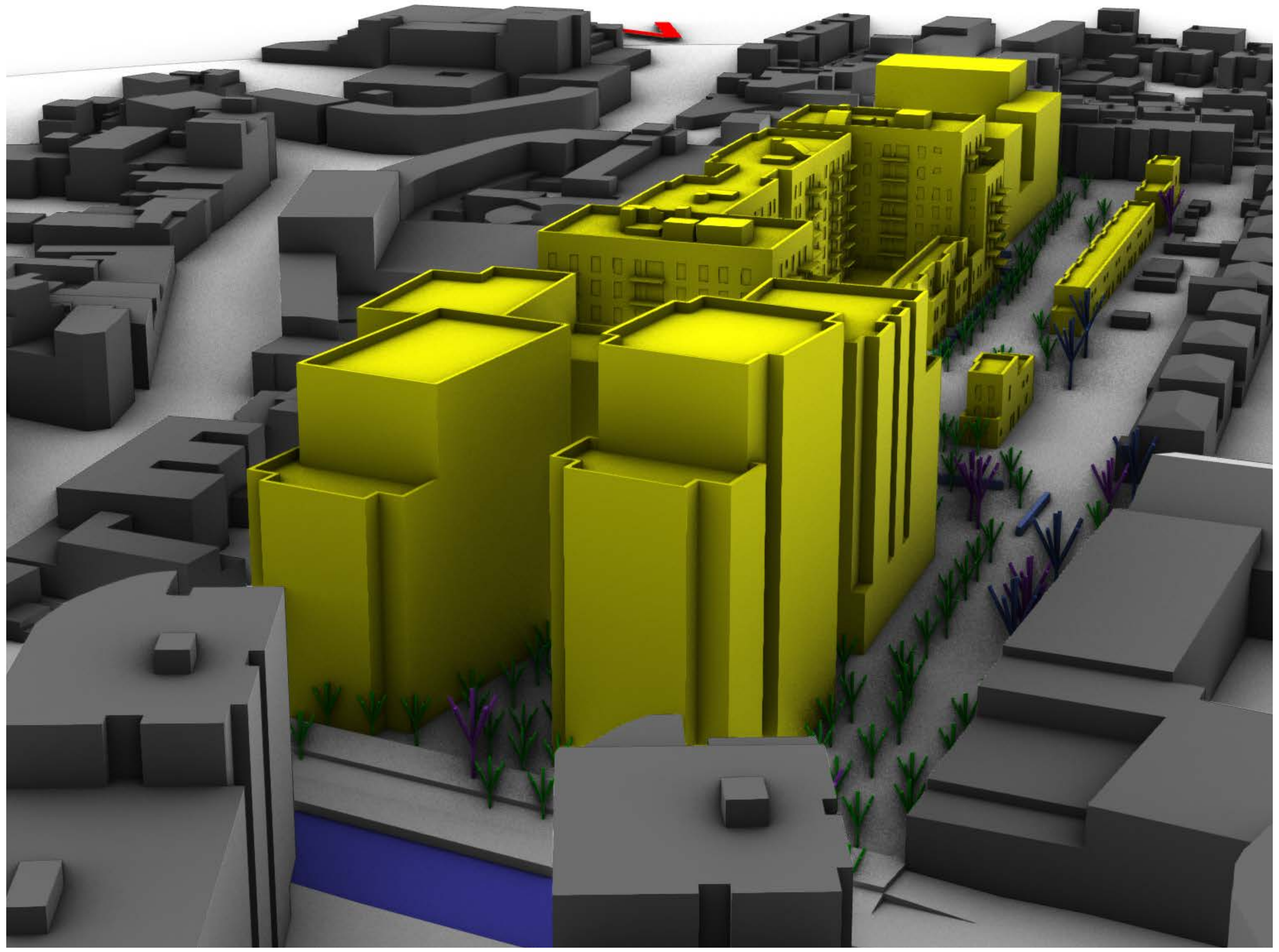


Figure D.4. Tested Mitigation Render - Southern Aspect

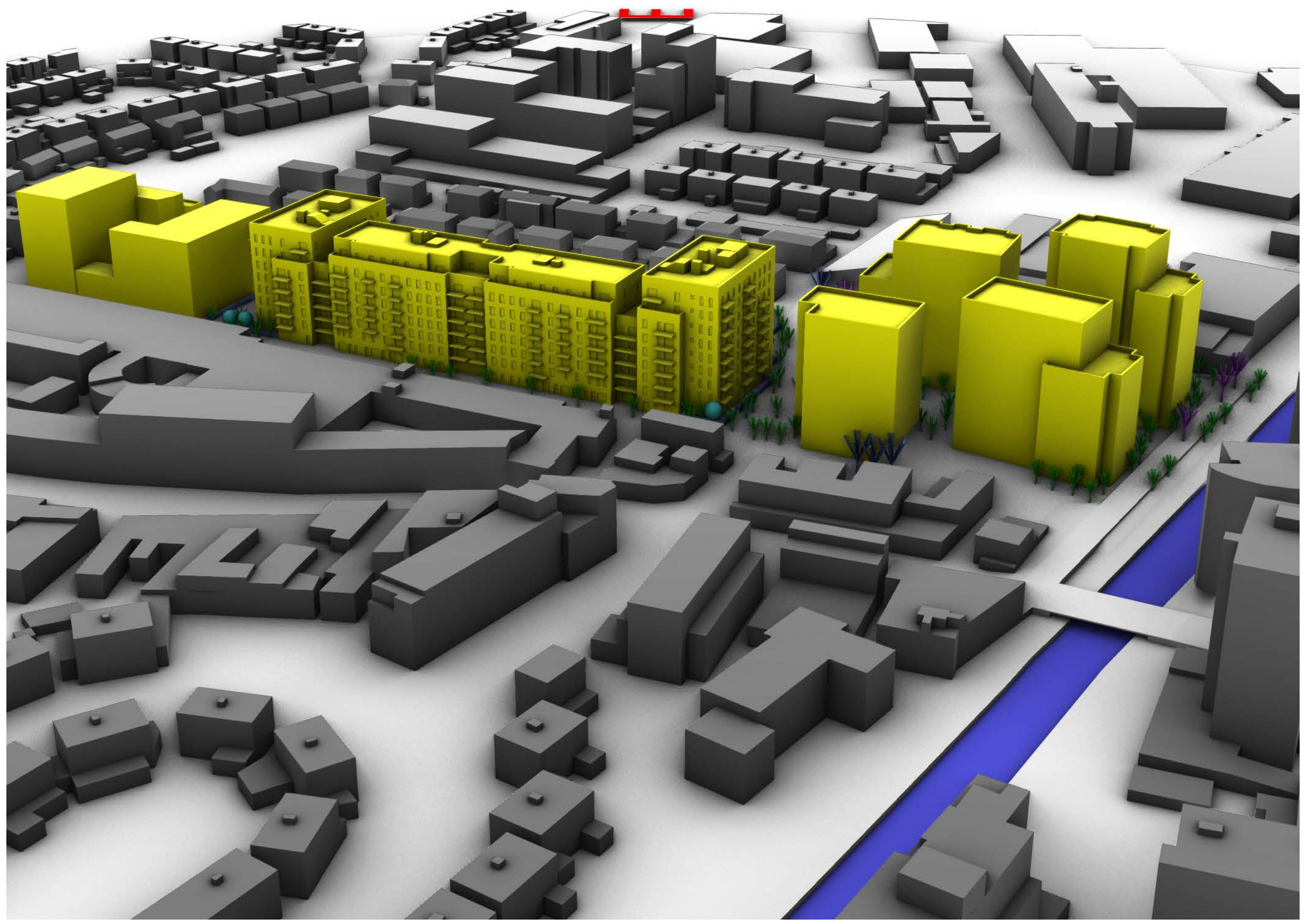


Figure D.5. Tested Mitigation Render - Western Aspect