FINAL REPORT

FORMER FORD DISTRIBUTION SITE

CORK, IRELAND

PEDESTRIAN LEVEL WIND MICROCLIMATE ASSESSMENT
RWDI #2409673
2ND DECEMBER 2024

SUBMITTED TO

McCutcheon Halley Consultants

SUBMITTED BY

RWDI Anemos Ltd

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VERSION HISTORY

RWDI Project #2409673	Former Ford Distribution Site, Cork, Ireland	
Report	**Releases**	**Dated**
Reports	Rev A	29th November 2024
	Rev B	2nd December 2024
Project Team	IA	
	SE	
	KJ	
	TV	

1 EXECUTIVE SUMMARY

RWDI was retained to conduct a pedestrian level wind microclimate assessment of the proposed Former Ford Distribution Site development in Cork, Ireland, (referred to as the "Proposed Development" hereafter in this report). This report presents a description of the methodology used and the results of three configurations tested using Computational Fluid Dynamics (CFD) simulations, namely:

- Configuration 1: Existing Site with Existing Surrounding Buildings (Baseline);
- Configuration 2: Proposed Development with Existing Surrounding Buildings; and
- Configuration 3: Proposed Development with Cumulative Surrounding Buildings.

All the Configurations were assessed devoid of existing or proposed landscaping, or wind mitigation measures in order to present a worst-case (i.e. windy) scenario. Results are presented in terms of the RWDI Comfort Criteria with the main focus on the winter (generally the windiest) season and the summer season, when amenity spaces are expected to be most frequently used.

Meteorological data representative of Cork indicates prevailing winds from the south-west and north-west throughout the year with a secondary peak from the south-east (during the winter season).

Wind speeds in Cork, and generally in Ireland, are quite high compared to England for example and therefore given the open nature of the Site with limited surrounding buildings, the wind conditions in Configuration 1 are inherently windy. There are instances of safety exceedance at the Site.

With the introduction of Proposed Development massing (Configuration 2) there would be a reduction in the windiness at ground level as the massing would disrupt the approaching wind flow significantly. All the entrances would be suitable for the intend use. However, there would be windy conditions at certain thoroughfare locations, ground level amenity areas and balcony locations. Therefore, mitigation measures have been suggested.

Introduction of the cumulative surroundings, which would be in close proximity of the Proposed Development would result in calmer areas compared to Configuration 2 as the adjacent cumulative scheme would provide increased the shelter from the prevailing south-westerly winds. However, there would remain several isolated areas within the Proposed Development at ground and balcony levels which would have unsuitable and potentially unsafe wind conditions for the intended use. As such, mitigation measures have been suggested and are discussed further within this report. These measures can only be confirmed through further testing.

2 INTRODUCTION

RWDI was retained by McCutcheon Halley Consultants to conduct a pedestrian level wind microclimate assessment for the Proposed Development in Cork, Ireland. This report presents the background and objectives from RWDI's assessment. A summary of the overall recommendations from the study are presented in Section 8 "Concluding Remarks".

3 BACKGROUND AND APPROACH

Computational Fluid Dynamics (CFD) simulations were conducted on the Proposed Development in Cork, Ireland. The assessment quantifies the wind conditions within and around the Site, by comparing the measured wind speed and frequency of occurrence with the RWDI Comfort Criteria. Meteorological data for Cork has been analysed and adjusted to the Site conditions by modelling the effect of terrain roughness in the computational domain.

Three configurations were simulated, as follows:

- Configuration 1: Existing Site with Existing Surrounding Buildings (Baseline);
- Configuration 2: Proposed Development with Existing Surrounding Buildings; and
- Configuration 3: Proposed Development with Cumulative Surrounding Buildings.

3.1 Site Description and Surroundings

The Site is in Cork, Ireland, located approximately 350m to the west of Páirc Uí Chaoimh and approximately 300m south of the River Lee. The Site is adjacent to the SHD scheme (reference number for the permitted scheme is: ABP-309059-20) to the south-west, Centre Park Road to the north-west, and unused grasslands to the north, north-east and south-east.

The area surrounding the Site can be characterised by clusters of low-rise buildings (typically no taller than 5 storeys), with the exception of the Páirc Uí Chaoimh Stadium to the south-east. The low-rise buildings surrounding the Site would be expected to provide limited shelter to the Site from approaching winds. The approaching winds can therefore be expected to have lower turbulence and higher mean wind speeds than if the Site were surrounding by buildings of a similar height to the Proposed Development. An aerial view of the Site (with approximate site area highlighted in yellow) has been provided in Figure 1.

Figure 1: Aerial view of the Existing Site (Site highlighted in yellow)

3.2 The Proposed Development

The Proposed Development comprises of residential development including 181 apartment units in 2 blocks for the planning application. The Proposed Development is part of a strategic housing development at the Former Ford Site in the South Docks, Cork City. The residential buildings will vary from 8-10 storeys over podium level.

A 3D model of the Proposed Development is shown in Figure 2 below.

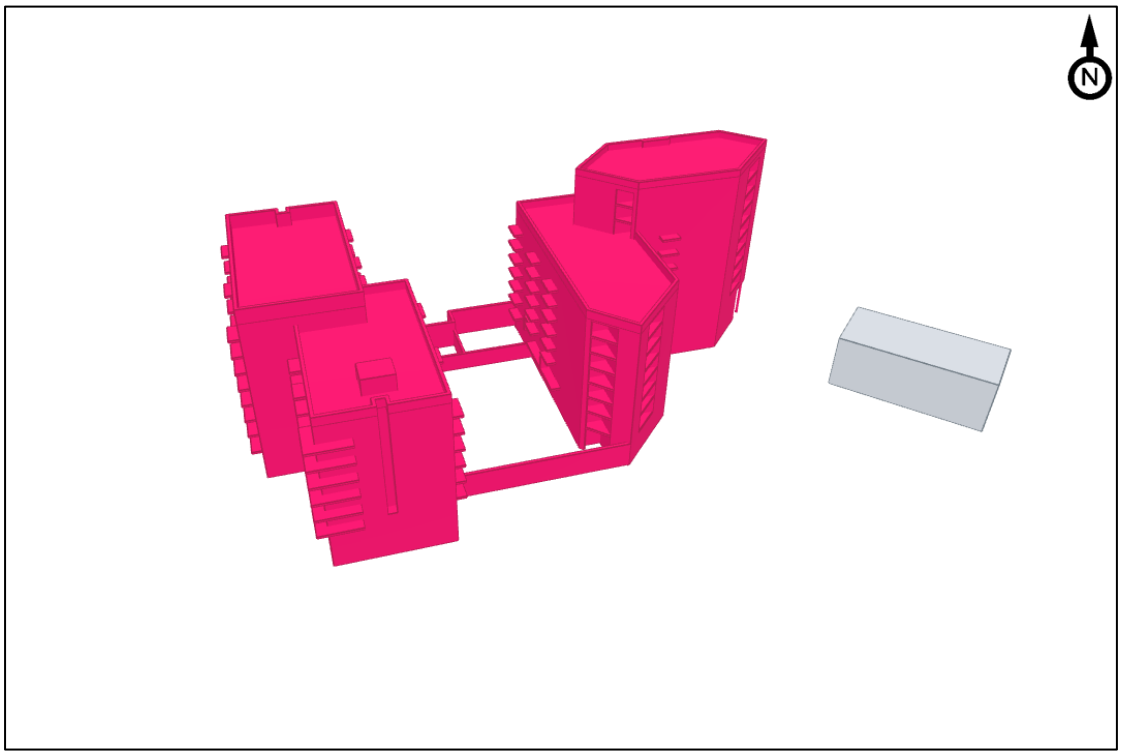

Figure 2: 3D model of the Proposed Development (in the context of the existing surrounding buildings) used for CFD simulations (view from south)

4 METHODOLOGY AND ASSESSMENT CRITERIA

The computational model of the Proposed Development in the context of the existing surrounding buildings used for CFD simulations of Configuration 2 is shown in Figure 2. In each of the three assessed scenarios surrounding buildings within a 400m radius of the centre of the Site were included.

The 'Results' section, shows the winter season and the summer season (June to August) comfort plots. The comfort results are assessed at a height of 1.5m above the ground or building surface to represent conditions around people. The colours correspond to the RWDI Comfort Criteria described below in 4.2 'Pedestrian Comfort'.

CFD is a computer modelling technique for numerically simulating wind flow in complex environments. For this study, computational modelling was undertaken using OpenFOAM version 4.1 with 18 wind angles tested for each scenario, equally spaced out around the compass (equal 20 degrees intervals). Although the strongest winds originate from the south-westerly sector, this quantity of wind angles will provide sufficient coverage of all aerodynamic interactions from winds from all angles.

The individual cases of the Proposed Development were solved using RANS approach with an RNG k-ε turbulence model. The steady state RANS type model with the RNG k- ε turbulence model is chosen over other turbulence models or transient type schemes for wind microclimate studies by RWDI for its ability to approximate highly complex flows within urban environments to a high level of accuracy against within a practical computational timeframe. RANS simulations yield statistically steady solutions which are, in the standard approach, unable to inform on the gusty nature of the flow. As comfort is a function of the average conditions, this model is suitable to analyse comfort conditions. We have used number of cells for different configuration; Configuration 1: 11373354 cells, Configuration 2: 14051200 cells, Configuration 3: 14508598 cells.

The potential for strong winds leading to potential safety issues is assessed using informed engineering judgement.

4.1 Meteorological Data

Figure 3 shows the seasonal wind roses (meteorological data) for the Cork area which are based on data obtained from the meteorological station at Cork Airport. 0 Degrees represents wind blowing from the north and 90 degrees represents wind blowing from the east.

Approximately 30 years of meteorological data for Cork Airport was used in this report, presented in the seasonal wind roses with the wind speed divided into wind speed thresholds (Figure 3). The radial axis indicates the cumulative number of hours per season that the wind speed exceeds the wind speed threshold as a percentage. The seasons are defined as spring (March, April and May), summer (June, July and August), autumn (September, October and November) and winter (December, January and February).

The meteorological data indicates that the prevailing wind directions throughout the year are from the south-west and north-west. There is a secondary peak from the south-easterly winds, especially during the winter.

The combination of meteorological data and velocity ratios permits the percentage of time that wind speeds are exceeded on the Site to be evaluated. The locations can then be assessed using 'comfort criteria', as described below.

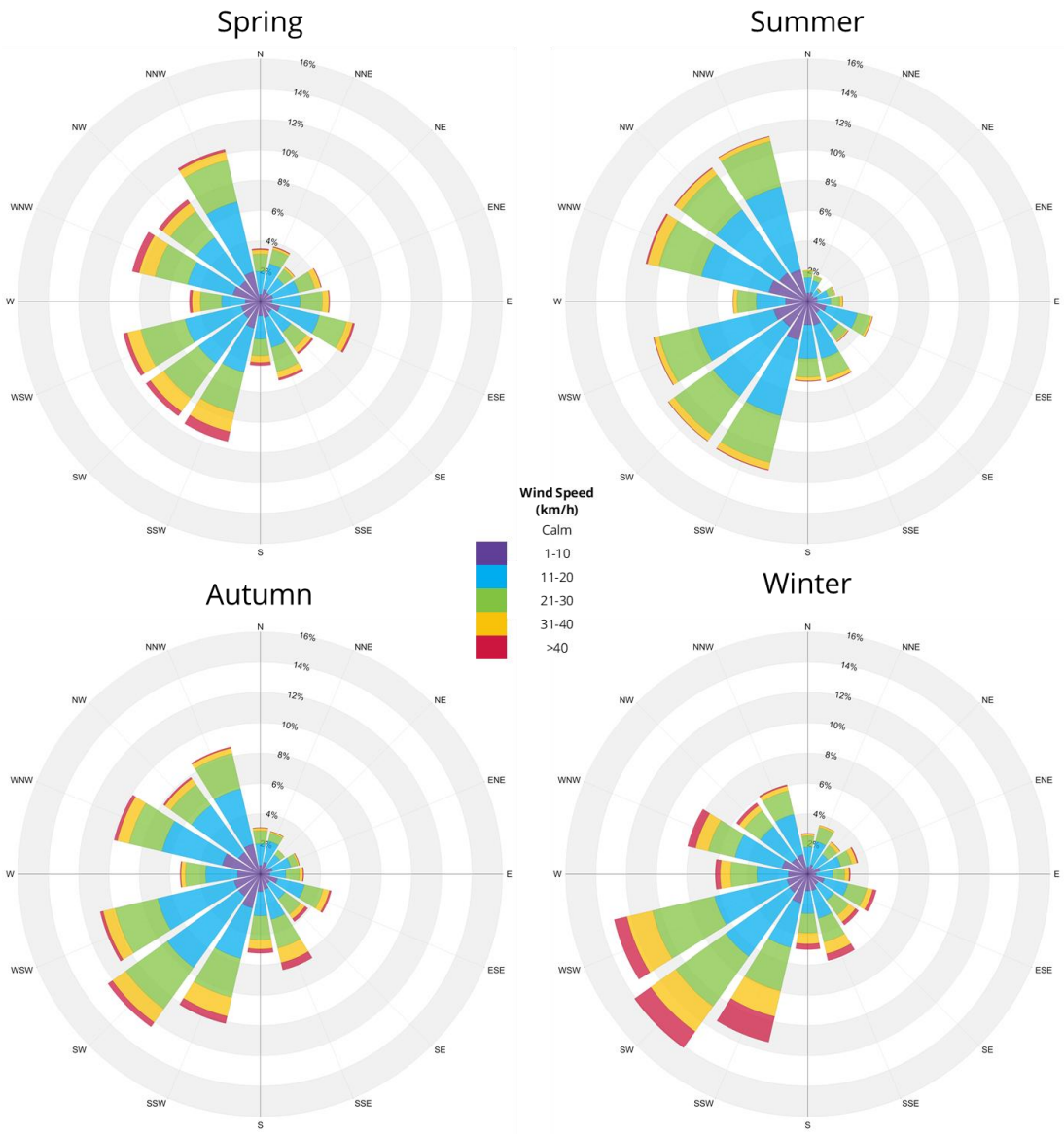

Figure 3: Seasonal Wind Roses for Cork Airport (in km/hr) (Radial axis indicated the percentage time for which the stated wind speed threshold is exceeded)

4.2 Pedestrian Comfort Criteria

The RWDI pedestrian wind criteria, which has been developed by RWDI through research and consulting practice since 1974, are used in the current study. These criteria have been widely accepted by municipal authorities as well as by the building design and city planning community. They are sometimes subjective and regional differences in wind climate and thermal conditions as well as variations in age, health, clothing, etc. can affect a person's perception of the wind climate. Therefore, comparisons of wind speeds for the existing and proposed building configurations are the most objective way in assessing local pedestrian wind conditions.

Table 1: RWDI Comfort Criteria

Comfort Category	Mean Wind Speed (km/h)	Description
Sitting	≤ 10	Calm or light breezes desired for outdoor restaurants and seating areas where one can read a paper without having it blown away
Standing	≤ 14	Gentle breezes suitable for main building entrances, bus stops, and other places where pedestrians may linger
Strolling	≤ 17	Moderate winds that would be appropriate for window shopping and strolling along a downtown street, plaza or park
Walking	≤ 20	Relatively high speeds that can be tolerated if one's objective is to walk, run or cycle without lingering
Uncomfortable	> 20	Strong winds of this magnitude are considered a nuisance for all pedestrian activities, and wind mitigation is typically recommended

Notes:

(1) Mean wind speeds listed above are based on a seasonal exceedance of 20% of the time between 6:00 and 23:00. Nightly hours between 0:00 and 5:00 are excluded from the wind analysis for comfort since limited usage of outdoor spaces is anticipated.

4.3 Strong Winds

The criteria also specify a lower limit strong wind threshold when winds exceed 90km/h for more than 0.1% of the time (approximately nine hours per year). When winds exceed this threshold, they represent a safety issue for all members of the population, which would require mitigation to provide an appropriate wind environment.

Strong winds are generally associated with areas which would be classified as uncomfortable for any use. In a mixed-use urban development scheme, uncomfortable conditions would not usually form part of the 'target' wind environment and would usually require mitigation due to pedestrian comfort considerations. This mitigation would also reduce the frequency of, or even eliminate, any strong winds.

It should be noted that the CFD simulations will provide an average expected wind speed for the winter season (typically the windiest months - December to February) and summer season (June to August) in regard to pedestrian comfort. Areas which would have uncomfortable wind conditions would be likely to have instances of strong winds. As such, professional judgement incorporating RWDI's experience of a large number of similar projects both within the UK and internationally has been applied, informed by the CFD results to identify areas of the Proposed Development likely to have instances of strong winds.

5 RESULTS

5.1 Details of Analysis

To account for the difference in height and terrain roughness between meteorological conditions at the airport and the Site, a terrain roughness assessment was conducted for the Proposed Development which is taken into account during the CFD simulations. For the Proposed Development, a suburban roughness factor was used to adjust the meteorological data due to the relatively built up surroundings of the Site.

5.2 Desired Pedestrian Activity around the Development

Generally, for the Proposed Development, the target conditions are:

1. Strolling during the winter season on pedestrian thoroughfares;
2. Standing conditions at main entrances, drop off areas or taxi ranks, and bus stops throughout the year; and
3. Sitting conditions at outdoor seating and amenity areas during the summer season when these areas are more likely to be frequently used by pedestrians.

The uncomfortable classifications are usually avoided because of their association with occasional strong winds, unless they are on a minor pedestrian route or a route where pedestrian access could be controlled in the event of strong winds.

Achieving a sitting classification in the summer usually means that the same receptor would be acceptable for standing in the winter season because winds are stronger at this time.

This is considered an acceptable occurrence for the majority of external amenity spaces because other factors such as air temperature and precipitation influence people's perceptions about the 'need' to use seating in the winter season.

It should be noted that a mixture of sitting use and standing use is acceptable for larger amenity spaces, provided designated seating locations are not located at the windier locations suitable for standing use. Furthermore, standing use conditions are also considered tolerable at private amenity areas (such as balconies) where the occupant has control over the use of the space.

5.3 Performance against the Lawson Comfort Criteria

The wind microclimate within and around the site has been assessed and classified using the Lawson Comfort Criteria defined in Table 1. The results of the assessment for each configuration are described below and presented graphically in Figures 4 – 21.

All the configurations are devoid of landscaping in order to assess a worst-case (i.e. windy) scenario.

5.3.1 Configuration 1 – Existing Site with Existing Surrounding Buildings

The wind microclimate results for Configuration 1 are shown in the following figures:

- Figure 4: Winter Season: Ground Level; and
- Figure 5: Summer Season: Ground Level.

5.3.2 Configuration 2 – Proposed Development with Existing Surrounding Buildings

The wind microclimate results for Configuration 2 are shown in the following figures:

- Figure 6: Winter Season: Ground Level;
- Figure 7: Summer Season: Ground Level;
- Figure 8: Winter Season: Roof Level;
- Figure 9: Summer Season: Roof Level;
- Figure 10: Winter Season: Balcony Level; and
- Figures 11: Summer Season: Balcony Level.

5.3.3 Configuration 3 – Proposed Development with Cumulative Surrounding Buildings

The only cumulative withing the study radius would be the adjacent SHD scheme (reference number for the permitted scheme is: ABP-309059-20).

The wind microclimate results for Configuration 3 are shown in the following figures:

- Figure 12: Winter Season: Ground Level;
- Figure 13: Summer Season: Ground Level;
- Figure 14: Winter Season: Roof Level;
- Figure 15: Summer Season: Roof Level;
- Figure 16: Winter Season: Balcony Level; and
- Figures 17: Summer Season: Balcony Level.

6 DISCUSSION

This discussion compares the measured wind conditions (shown in the contour plots) to the anticipated use of the Site, to provide an assessment of whether the conditions would be suitable or too windy for the intended use.

Any areas not specifically mentioned would be suitable, or calmer than required, for the desired pedestrian use. Areas that are windier than suitable for the intended pedestrian use would require mitigation.

No landscaping was included in any tested configuration, in order to present a worst-case (i.e. windy) scenario.

6.1 Configuration 1: Existing Site with Existing Surrounding Buildings

Results for the existing Site within the context of the existing surrounding buildings are presented in Figure 4 for ground level during the winter season. Figure 5 presents results for ground level during the summer season, when amenity spaces are expected to be used more frequently.

6.1.1 Pedestrian Comfort

Wind conditions for the baseline scenario (the existing Site with existing surrounding buildings) range from suitable for sitting to uncomfortable for any use at the Site and in the nearby surrounding area during the winter season. As such there are thoroughfare locations around the existing Site and surrounding area which would have unsuitable wind conditions.

During the summer season wind conditions range from suitable for sitting to strolling use with an isolated area of uncomfortable use to the north-west corner of the existing building.

This represents an intrinsically 'windy' environment. As such, it can be seen from this that that the background wind environment of the site (absent the impact of the buildings) would generally be:

- Conditions suitable for walking or else uncomfortable for all uses during the winter season;
- Conditions suitable for strolling/walking in the summer;

This provides a useful benchmark against which the potential impacts of the Proposed Development can be compared and assessed.

6.1.2 Strong Winds

Strong winds with the potential to be a safety concern for cyclists and more vulnerable pedestrians would be anticipated to occur when wind conditions are suitable for uncomfortable for all intended uses during the winter season. Professional judgement has been applied, informed by the CFD results, to identify areas likely to have instances of strong winds.

Strong wind exceedances occur during the winter season are uncomfortable for all pedestrian use. As such, strong winds exceeding the safety threshold occur in the baseline.

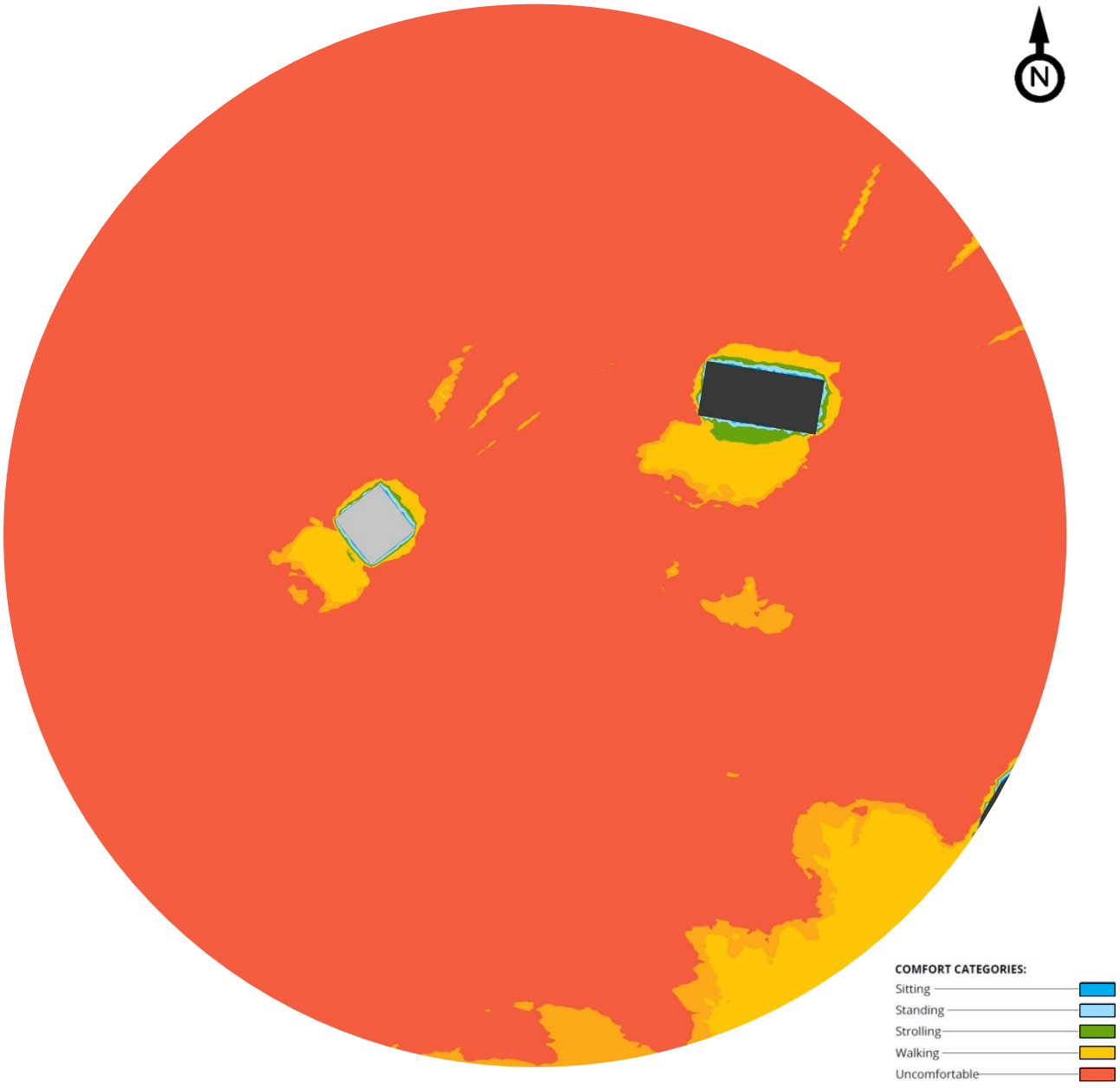

Figure 4: Configuration 1 – Existing Site with the Existing Surrounding Buildings, Ground Level – Winter Season

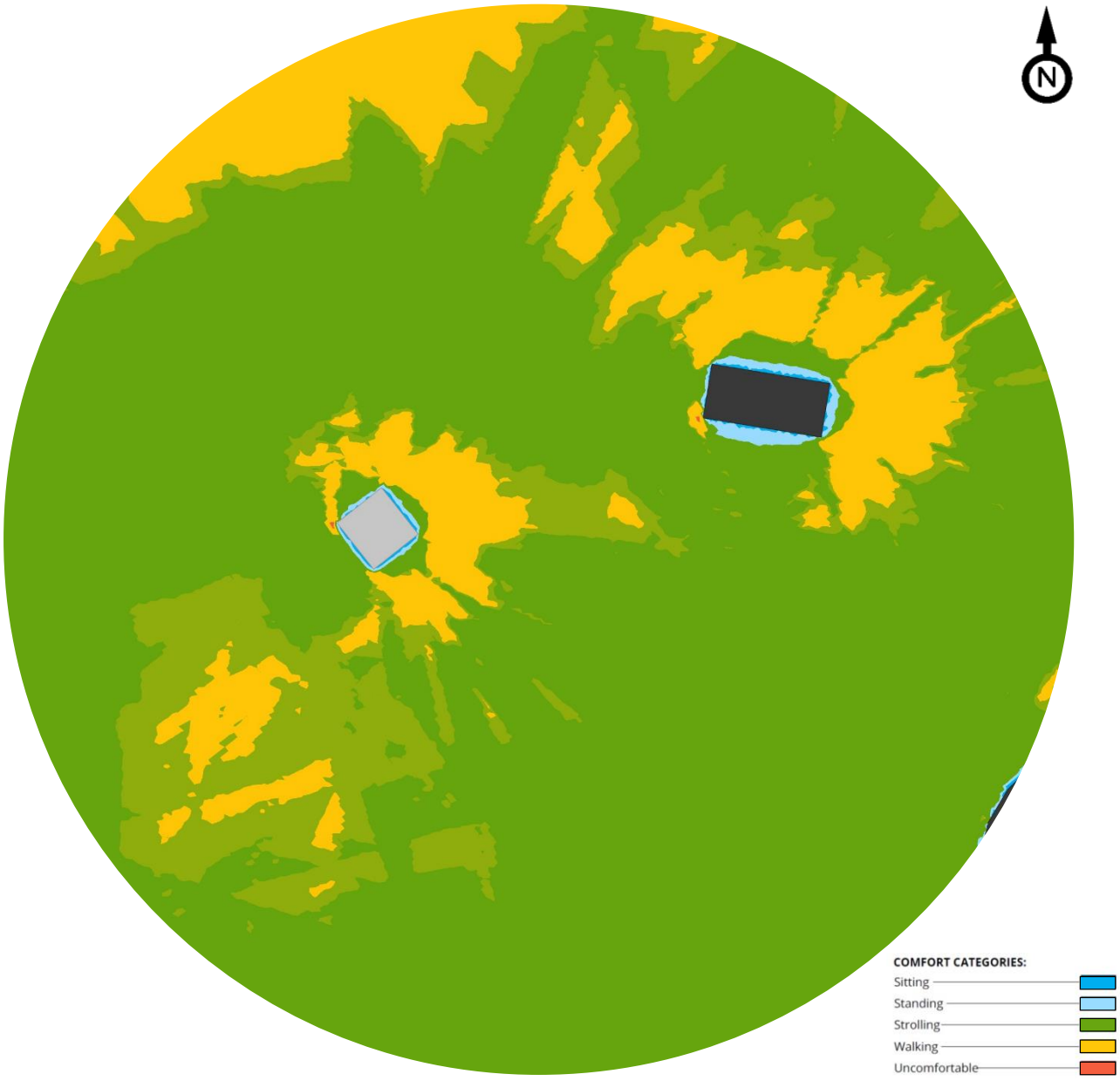

Figure 5: Configuration 1 – Existing Site with the Existing Surrounding Buildings, Ground Level – Summer Season

6.2 Configuration 2: Proposed Development with Existing Surrounding Buildings

Results for the Proposed Development with the existing surrounding buildings are presented in Figures 6 and 7 for ground level during the winter and summer seasons respectively. Figures 8 and 9 present results for the podium level during the winter and summer seasons and Figures 10 and11 present results for the balconies around the Proposed Development during the winter and summer season.

6.2.1 Pedestrian Comfort

With the Proposed Development in place, wind conditions around localised areas of the Site would improve compared to the baseline scenario; resulting in calmer wind conditions around the Proposed Development. As such the majority of the Proposed Development would have safe and suitable wind conditions for the intended use. Wind conditions around the Proposed Development during the winter season would range from suitable for sitting to uncomfortable use. There would be thoroughfare locations and one entrance location which would have unsuitable wind conditions around the Proposed Development and would require mitigation discussed in Section 7 of this report.

During the summer season, wind conditions would range from suitable for sitting to walking use condition with an isolated area of uncomfortable condition to the north-west corner of the Proposed Development at ground level. At roof and balcony levels wind conditions would range from sitting to uncomfortable use condition. Mitigation would be required at these amenity spaces around the Proposed Development due to unsuitable wind conditions.

6.2.1.1 Thoroughfares (Figure 6)

There would be thoroughfare areas at the western corner of Block A of the Proposed Development, the southern corner of Block A, and the eastern corner of Block B which would have uncomfortable wind conditions for any use during the winter season, up to two categories windier than the desired strolling use wind conditions. These thoroughfare areas would require mitigation measures to ensure suitable wind conditions for the intended pedestrian use discussed in Section 7 of this report.

Likewise, the majority of the thoroughfare areas would have walking use wind conditions especially between Blocks A and B, one category windier than the desired strolling use wind conditions and require mitigation measures to ensure suitable wind conditions for pedestrian use. Wind conditions within all other areas would be similar or calmer than that in the baseline scenario.

6.2.1.2 Entrances (Figure 6)

All the entrances around the Proposed Development would have standing use or calmer wind conditions during the winter season, suitable for the intended use and as such would not require mitigation measures.

6.2.1.3 Ground Level Amenity Space (Figure 7)

The dedicated seating locations to the south-west of Block A would have strolling and standing use conditions during the summer season. Also, the courtyard space between Blocks A and B would have strolling use conditions during the summer season. Therefore, these areas would require mitigation measures to ensure suitable wind conditions for the intended pedestrian use.

The Creche Play Area to the east of Block B would have sitting use condition during the summer season, suitable for the intended use.

6.2.1.4 Balconies (Figures 10-13)

There would be a large number of balconies around the Proposed Development especially the corner balconies of Block A, balconies on the western facade of Block A and B with strolling, walking or uncomfortable for any use wind conditions during the summer season, windier than the required standing use wind conditions. Mitigation would be required and are discussed in Section 7 of this report.

All other balconies of the Proposed Development especially the inset balconies on Block B and balconies to the eastern façade of Block B would have the required sitting or standing use wind conditions desired for a private amenity space.

6.2.2 Strong Winds

Professional judgement has been applied, informed by the CFD results, to identify areas likely to have instances of strong winds.

Strong winds which would pose a safety concern for the occupants would be expected within the pedestrian accessible area which would have uncomfortable conditions at ground and balcony levels. Therefore, suitable wind mitigation measures would be required, discussed in Section 7 of this report. No mitigation would be required at the roof spaces as this would be accessed for maintenance purposes only. However, it is recommended that the access to these spaces is controlled during the windiest times of the year.

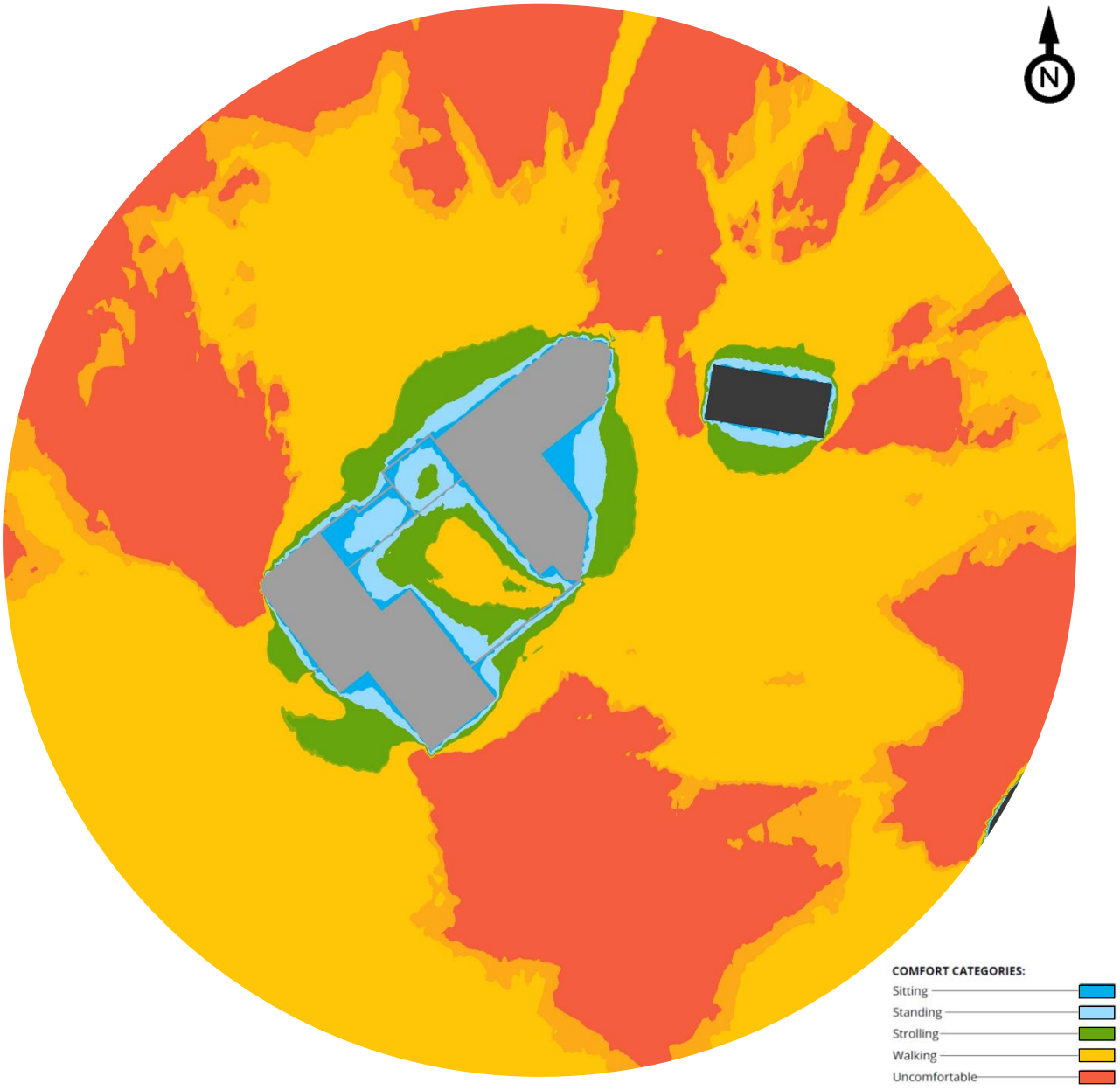

Figure 6: Configuration 2 – Proposed Development with the Existing Surrounding Buildings, Ground Level – Winter Season

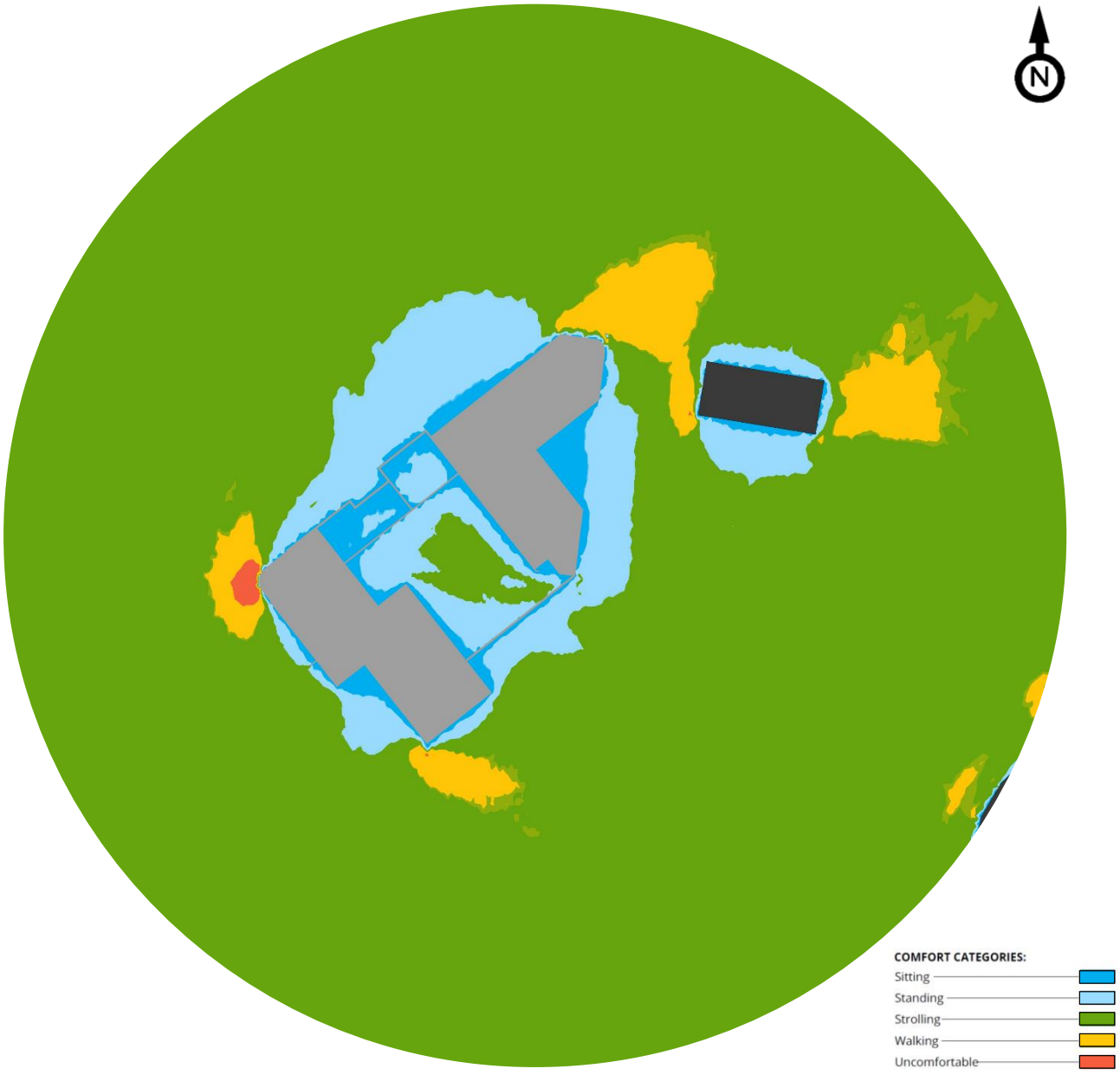

Figure 7: Configuration 2 – Proposed Development with the Existing Surrounding Buildings, Ground Level – Summer Season

Figure 8: Configuration 2 – Proposed Development with the Existing Surrounding Buildings, Roof Level – Winter Season

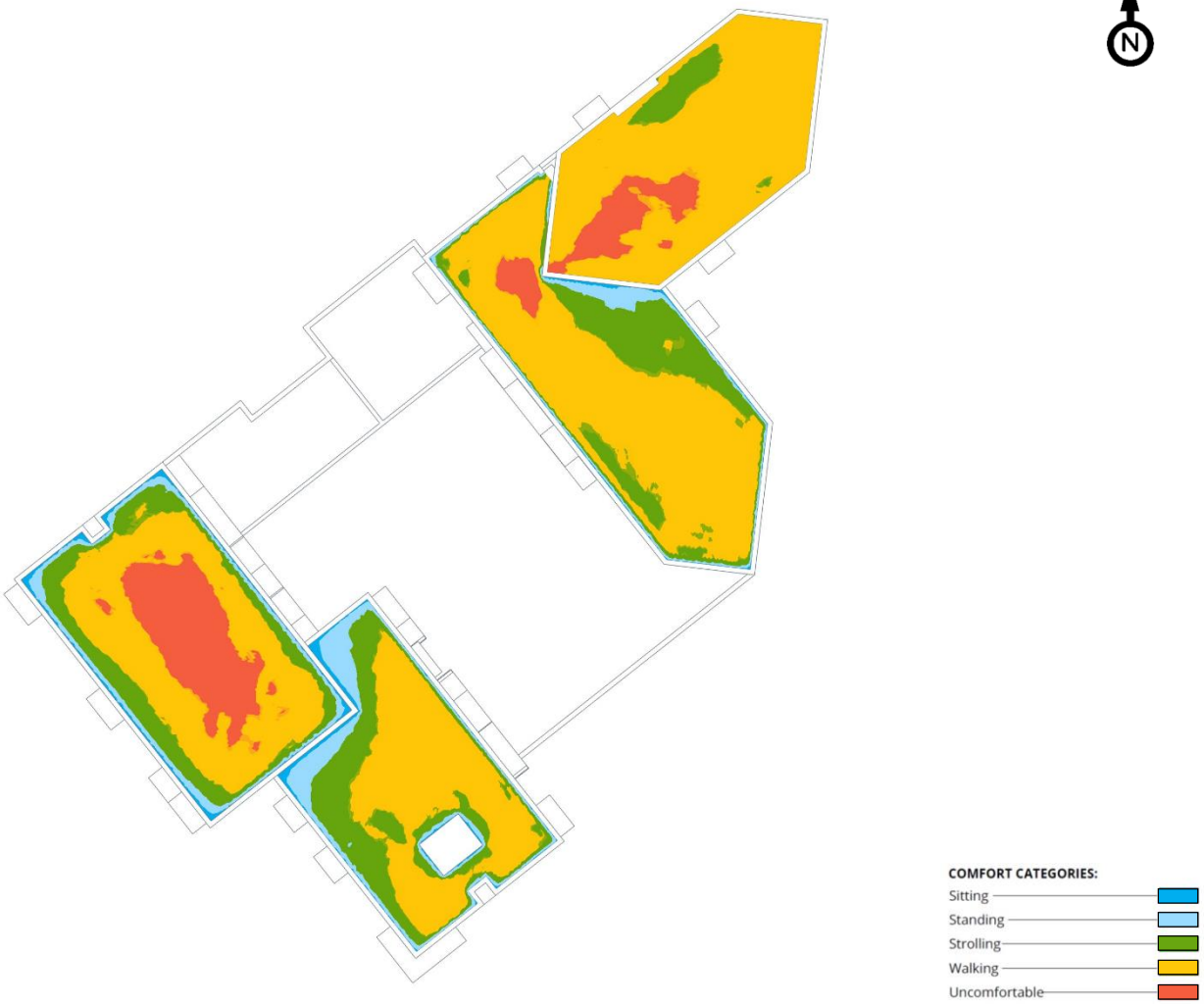

Figure 9: Configuration 2 – Proposed Development with the Existing Surrounding Buildings, Roof Level – Summer Season

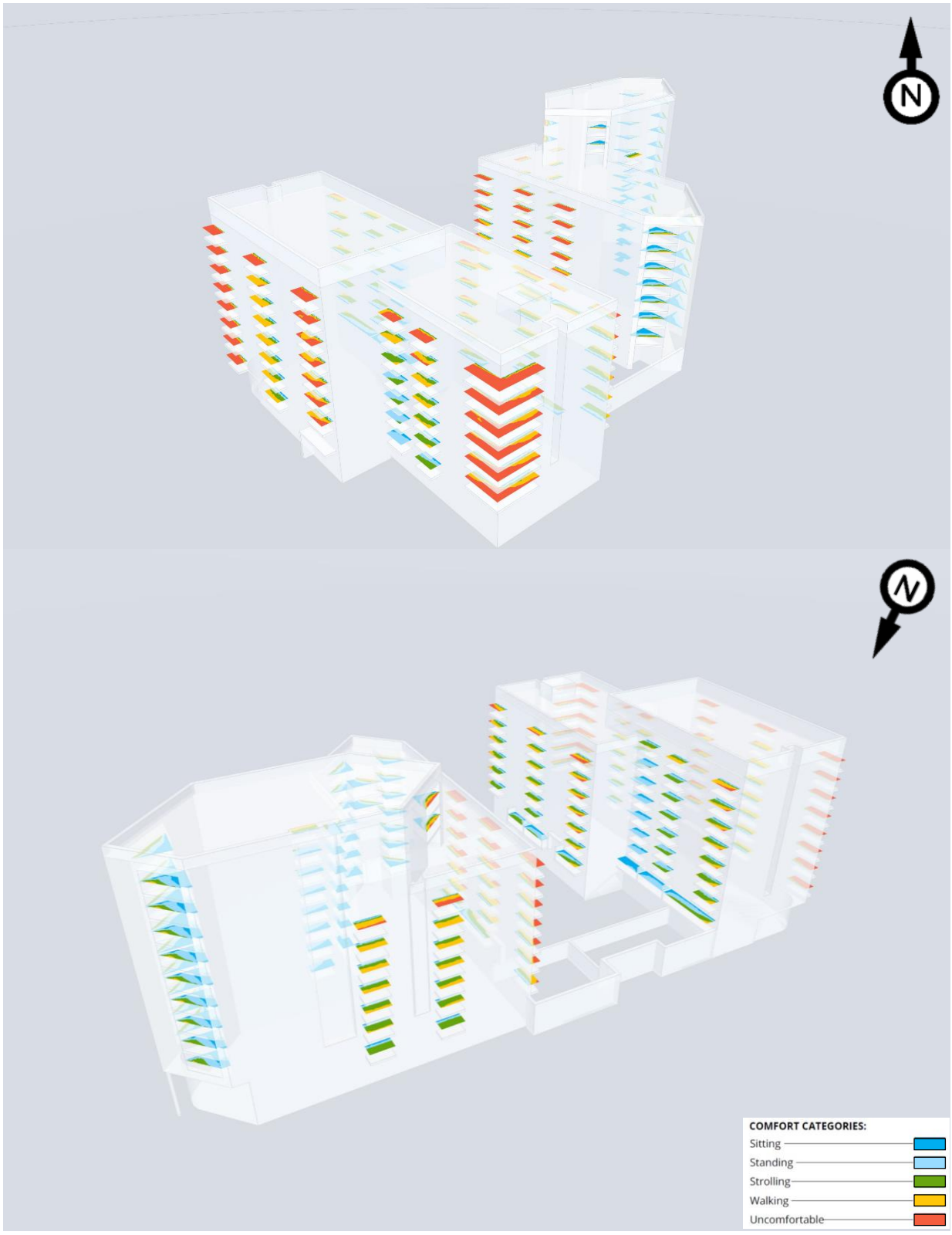

Figure 10: Configuration 2 – Proposed Development with the Existing Surrounding Buildings, Balcony Level – Winter Season

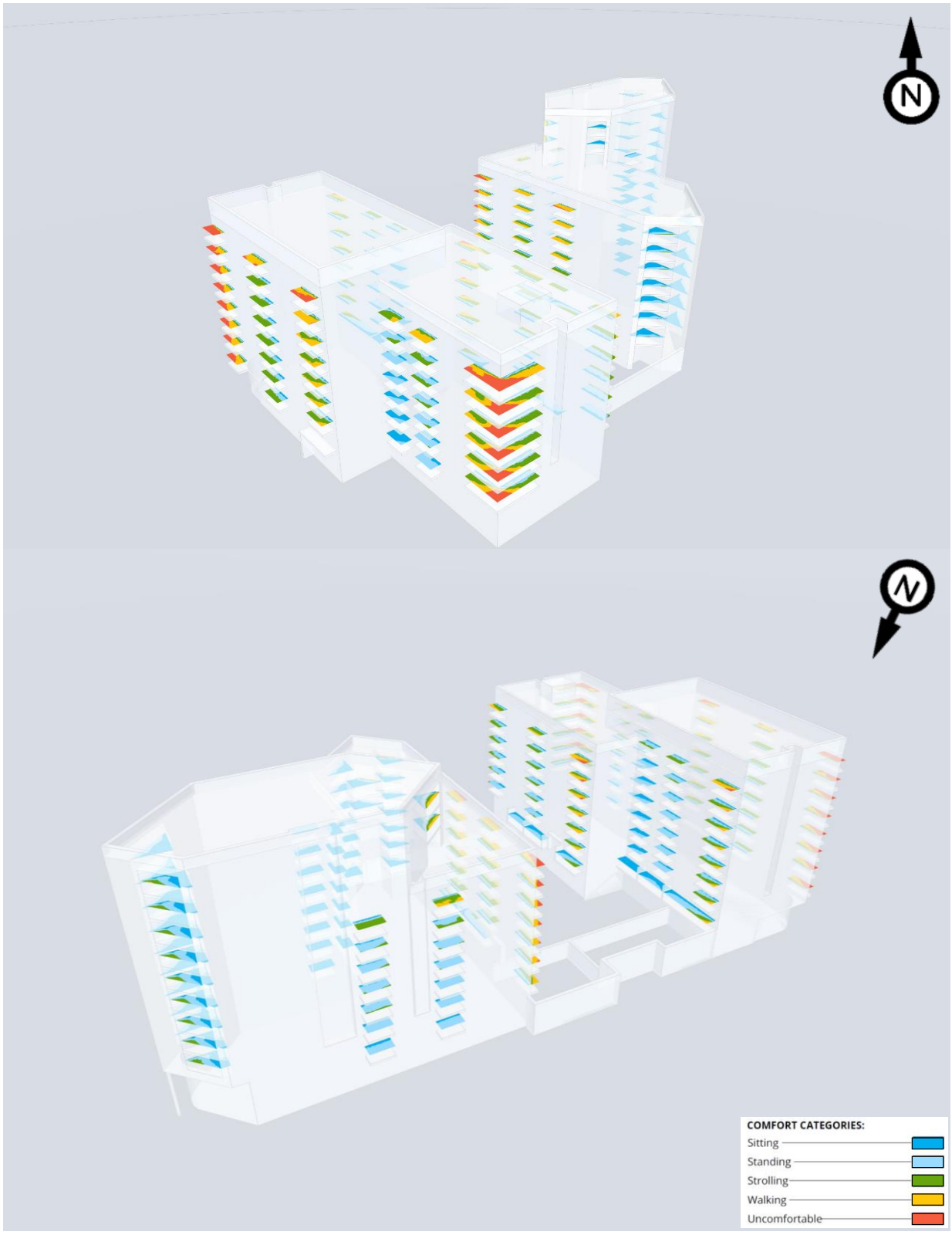

Figure 11: Configuration 2 – Proposed Development with the Existing Surrounding Buildings, Balcony Level – Summer Season

6.3 Configuration 3: Proposed Development with Cumulative Surrounding Buildings

Results for Configuration 3 are presented in Figure 12 and Figure 13 for ground level during the winter and summer seasons respectively. Figures 14 and 15 present the results at roof spaces during the winter and summer seasons respectively. Figures 16 and 17 present the results at balconies during the winter and summer seasons respectively.

6.3.1 Pedestrian Comfort

Inclusion of the adjacent SHD scheme would provide a notable increase in shelter from the prevailing south-westerly wind directions. This would result in calmer wind conditions within the Proposed Development compared to Configuration 2 and eliminate the occurrence of uncomfortable conditions around Block A and reduce the uncomfortable conditions to the north-east of Block B. However, there would still have uncomfortable condition to the north-east corner of Block B, specifically at the lobby entrance. Furthermore, similar to Configuration 2 the ground level seating to the south-west of Block A and within the podium space would have conditions windier than suitable for the intended use and would require wind mitigation measures.

The cumulative schemes would be beneficial to provide some shelter to the balcony amenity spaces. However, conditions windier than suitable for the intended use would persist and suitable wind mitigation measures would be required for these balconies.

6.3.2 Strong Winds

Strong winds with the potential to be a safety concern for cyclists and more vulnerable pedestrians would be anticipated to occur within areas where wind conditions uncomfortable for all intended uses predicted during the winter season. Professional judgement has been applied, informed by the CFD results, to identify areas likely to have instances of strong winds.

Strong winds which would pose a safety concern for the occupants would be expected within the pedestrian accessible area which would have uncomfortable conditions at ground and balcony levels. Therefore, suitable wind mitigation measures would be required discussed in Section 7 of this report. No mitigation would be required at the roof spaces as this would be accessed for maintenance purposes only. However, it is recommended that the access to these spaces is controlled during the windiest times of the year.

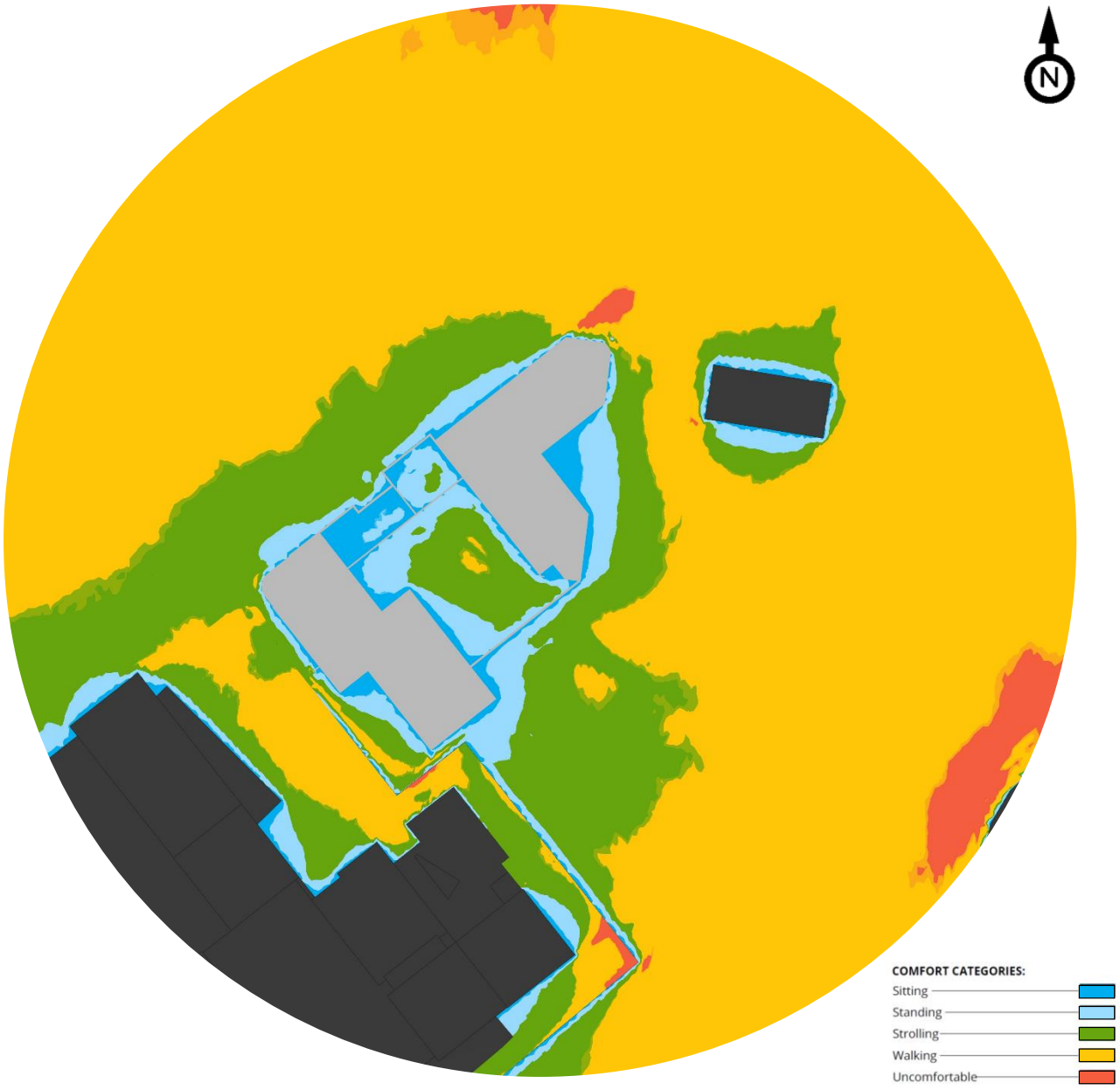

Figure 12: Configuration 3 – Proposed Development with Cumulative Surrounding Buildings Ground Level – Winter Season

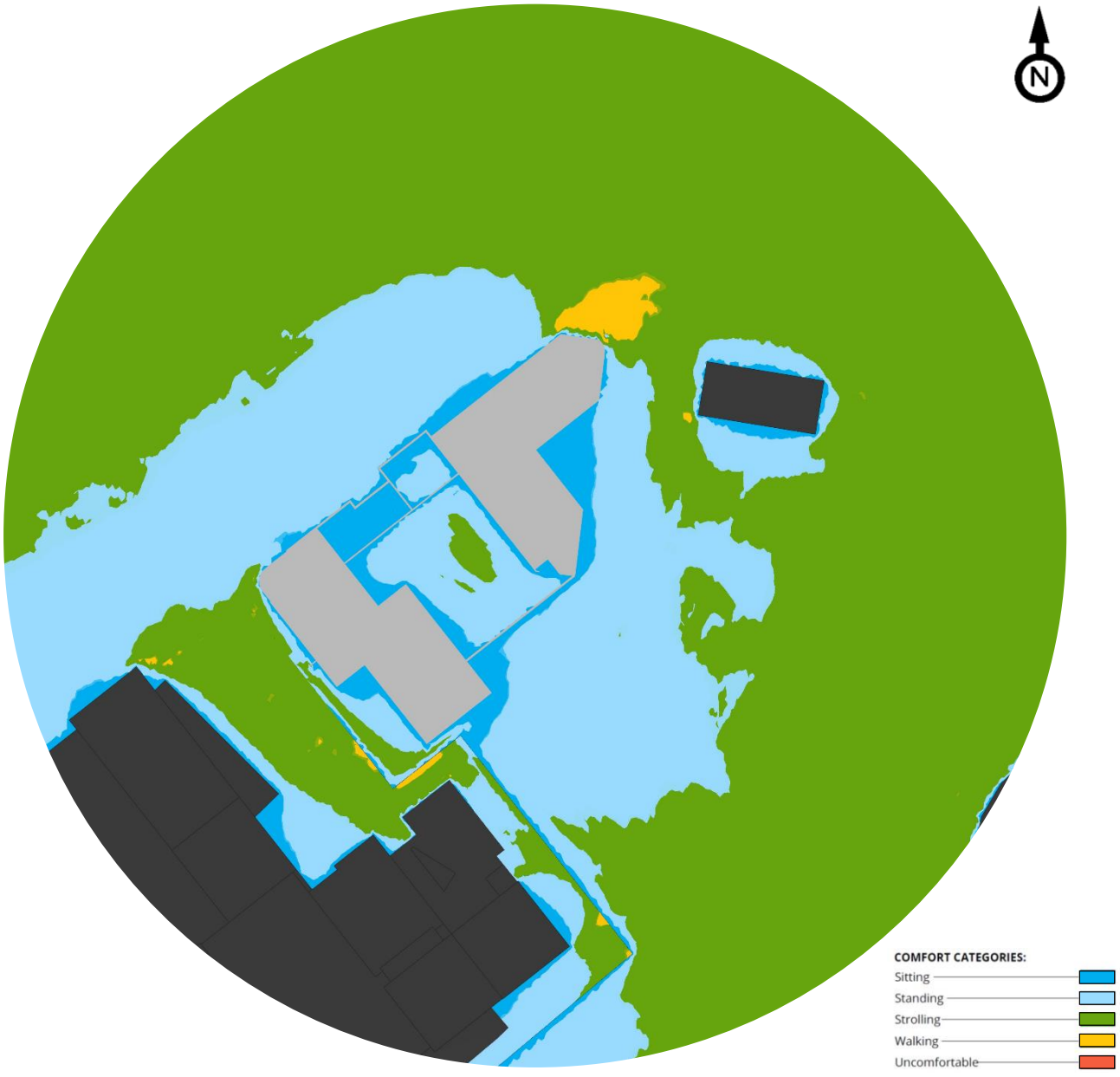

Figure 13: Configuration 3 – Proposed Development with Cumulative Surrounding Buildings, Ground Level – Summer Season

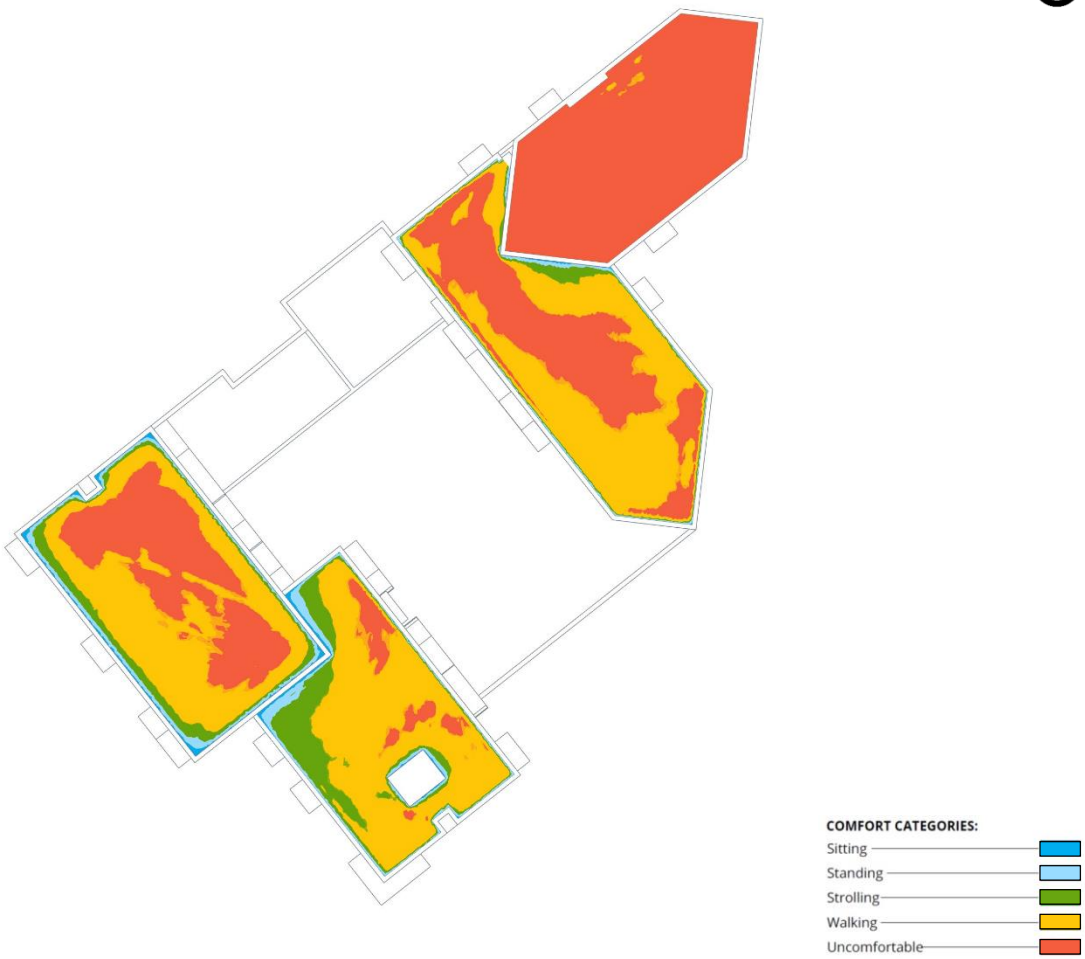

Figure 14: Configuration 3 – Proposed Development with Cumulative Surrounding Buildings, Roof Level – Winter Season

Figure 15: Configuration 3 – Proposed Development with Cumulative Surrounding Buildings, Roof Level – Summer Season

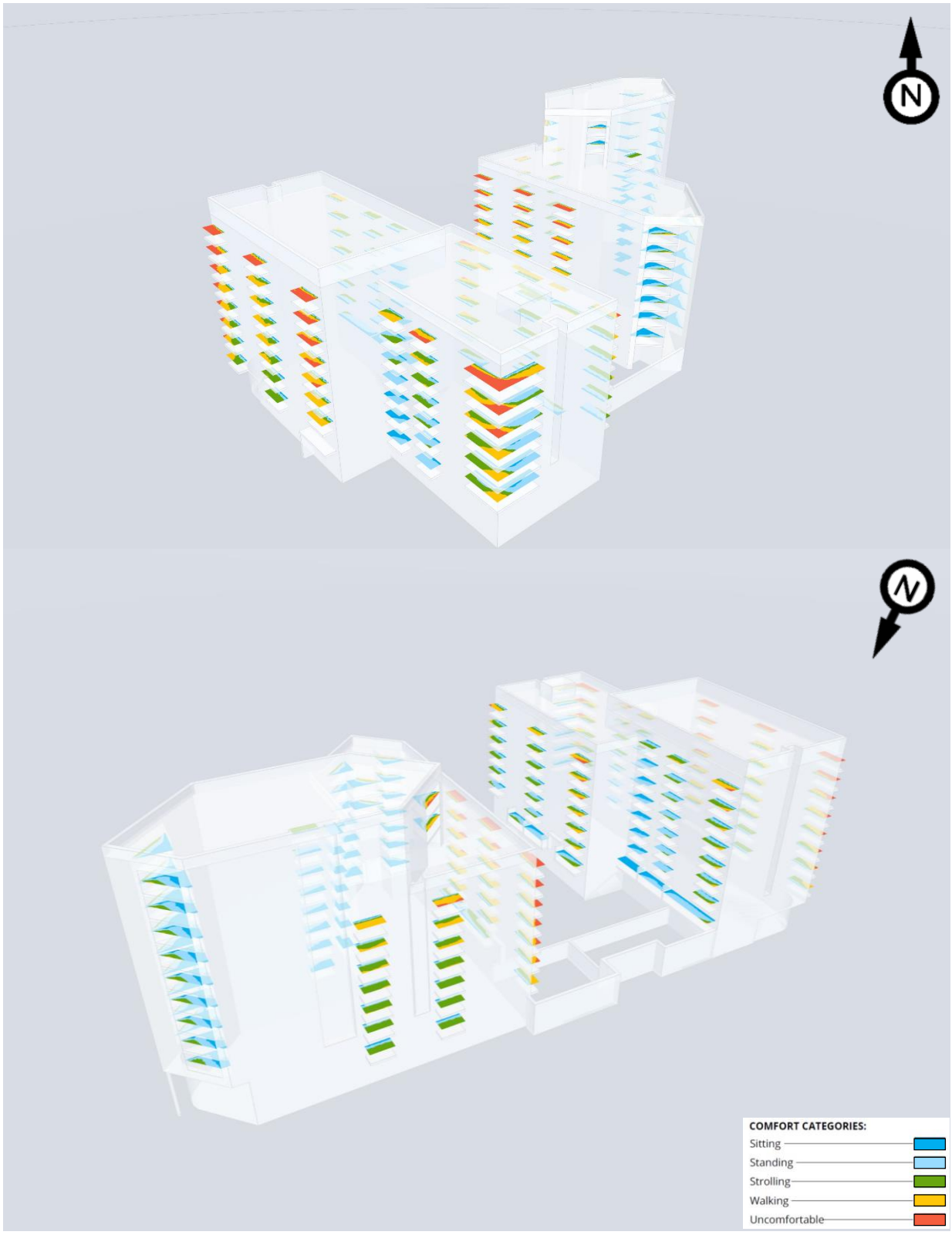

Figure 16: Configuration 3 – Proposed Development with Cumulative Surrounding Buildings, Balcony Level – Winter Season

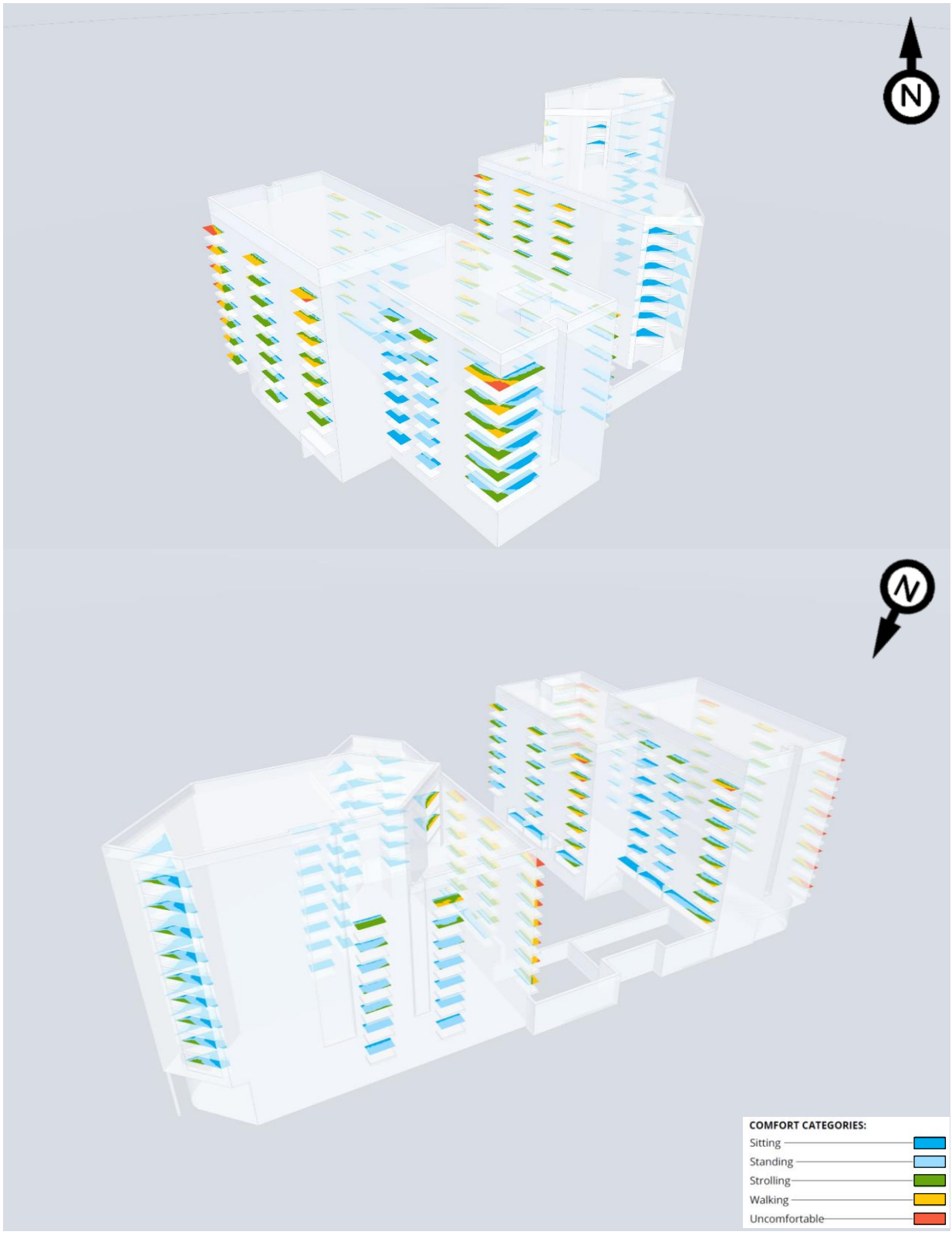

Figure 17: Configuration 3 – Proposed Development with Cumulative Surrounding Buildings, Balcony Level – Summer Season

7 WIND MITIGATION MEASURES

7.1 Development of Wind Mitigation Measures

Following the analysis of the Proposed Development with the existing surrounding buildings, several isolated areas at ground and balcony levels were identified as having unsuitable and, in some areas, potentially unsafe wind conditions. As such these areas required mitigation measures to be developed in order to ensure pedestrian safety and create a suitable wind environment around the Proposed Development.

We note that the ground level plan shows good amount of landscaping measures which would benefit at certain locations (see Appendix Figure 24). It should be noted that all heights for any soft landscaping elements are the 'as planted' heights prior to the occupation of the Proposed Development. Also, all the below mentioned mitigation measures would need to be confirmed through further testing.

7.1.1 Thoroughfares

Tall trees at least 5m in height, will provide some benefit in diffusing wind flow around the corners. Also, additional mitigation measures near the building corners (such as: solid or ~50% porous, screening at least 1.5m tall; solid or ~50% porous canopies at least 2m deep; and deciduous/evergreen trees at least 4m tall.

It should be noted that landscaping provided in windy spaces will need to thrive under adverse conditions – appropriate trees and planting should be selected, and protected (i.e. with screening) where required.

Figure 18: Example mitigation measures for pedestrian thoroughfares

7.1.2 Ground Level Amenity Areas

The ground level amenity spaces are generally expected to have a mixture of sitting and standing wind condition during the summer season. Hence, wind mitigation would be expected to provide shelter to seating provided in areas with standing and strolling conditions. The mitigation measures can be as follows;

- Solid or ~50% porous, screening surrounding seating areas (1.5m tall);
- Planters with planting (1.5m tall) surrounding seating areas; or
- Deciduous/evergreen trees (at least 4m tall).

Figure 19: Example mitigation measures for ground level amenity

7.1.3 Balconies

For private balconies with unsuitable wind conditions, suggested mitigation measures include:

- Solid or ~50% porous, balustrade (1.5m tall) around the perimeter of the balconies;
- Inclusion of 1.8m high solid/50% porous side screens and 1.5m high solid/50% porous balustrade on the remaining facade of the balcony; or
- Inclusion of 1.8m high solid/50% porous side screens and 1.2m high solid/50% porous balustrade on the remaining facade of the balcony.

Figure 20: Example mitigation measures for private balconies

8 CONCLUDING REMARKS

This report has identified the wind microclimate effects on the Proposed Development, based on an assessment conducted using Computational Fluid Dynamics (CFD) simulations. The following is a summary of the key points described in the report:

- The meteorological data indicates that the prevailing wind directions throughout the year are from the south-west and north-west. There is a secondary peak from south-easterly winds, especially during the winter.
- Wind conditions around the existing Site with existing surrounding buildings (Configuration 1), due the exposed nature of the Site and general windiness of Ireland with respect to England, would inherently be windy.
- With the Proposed Development (Configuration 2) introduced, the massing would be beneficial to reduce the windiness at ground level.
- There would remain several isolated areas within the Proposed Development at ground and balcony levels which would have unsuitable and potentially unsafe wind conditions for the intended use. As such, mitigation measures have been developed for these areas.

- Inclusion of the adjacent SHD scheme would provide a notable shelter from the prevailing south-westerly wind directions. This would result in calmer wind conditions within the Proposed Development compared to Configuration 2. However, there would still have uncomfortable condition to the north-east corner of Block B. Also, the windy ground level amenity areas and unsuitable balconies would also require mitigation measures.

9 STATEMENT OF LIMITATIONS

This report entitled Pedestrian Level Wind Microclimate Assessment dated December 2nd, 2024, was prepared by RWDI for McCutcheon Halley Consultants ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the development described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final design stage to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilise the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

RWDI #2409673
2nd December 2024

APPENDIX A: COMPUTATIONAL MODEL

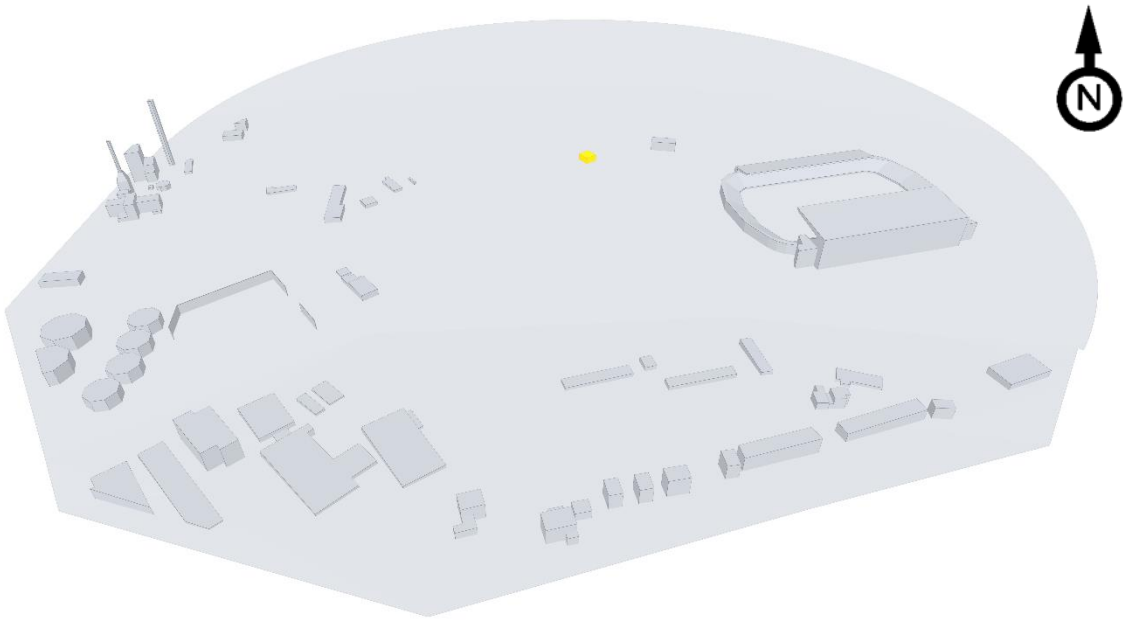

Figure 21 – Existing Site with Existing Surrounding Buildings 3D model used for Computational Fluid Dynamic simulations (view from the south)

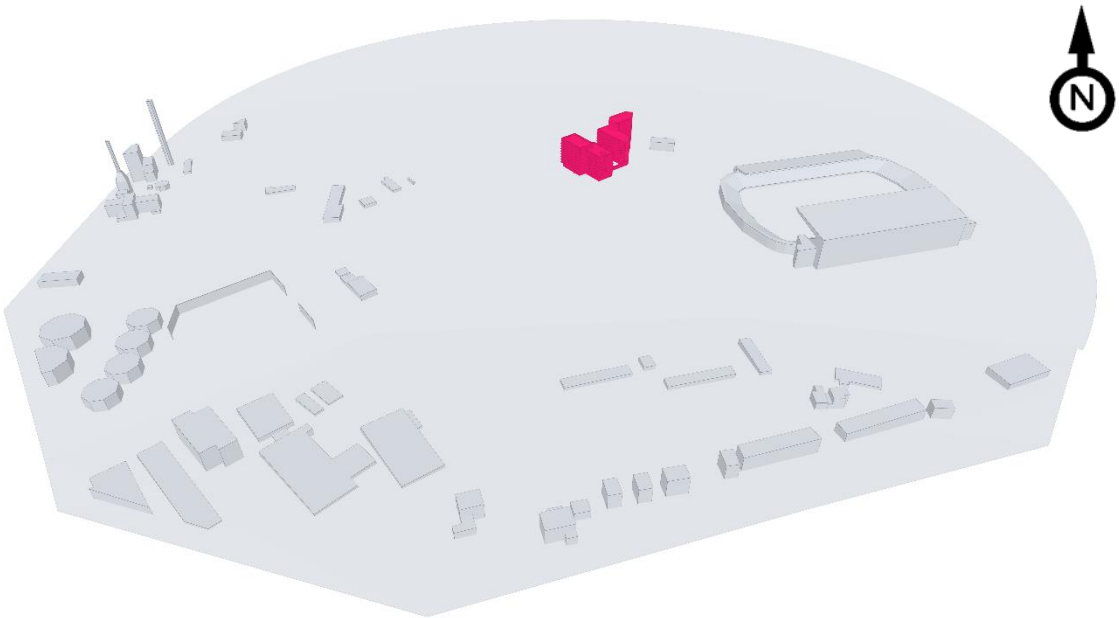

Figure 22 – Proposed Development with Existing Surrounding Buildings 3D model used for Computational Fluid Dynamic simulations (view from the south)

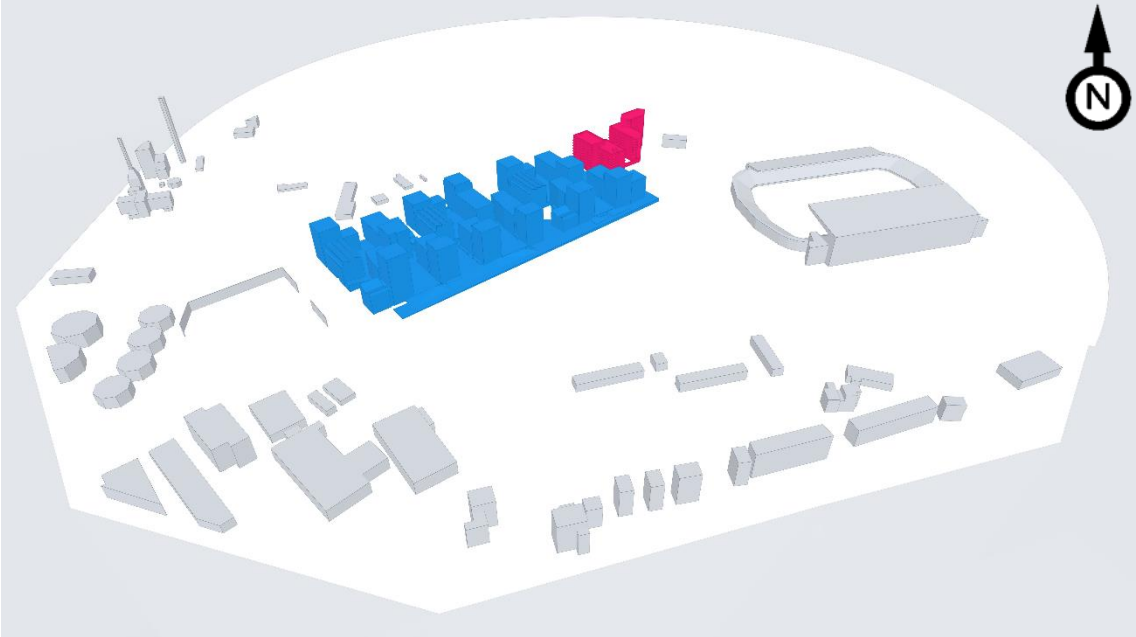

Figure 23 – Proposed Development with Cumulative Surrounding Buildings 3D model used for Computational Fluid Dynamic simulations (view from the south)

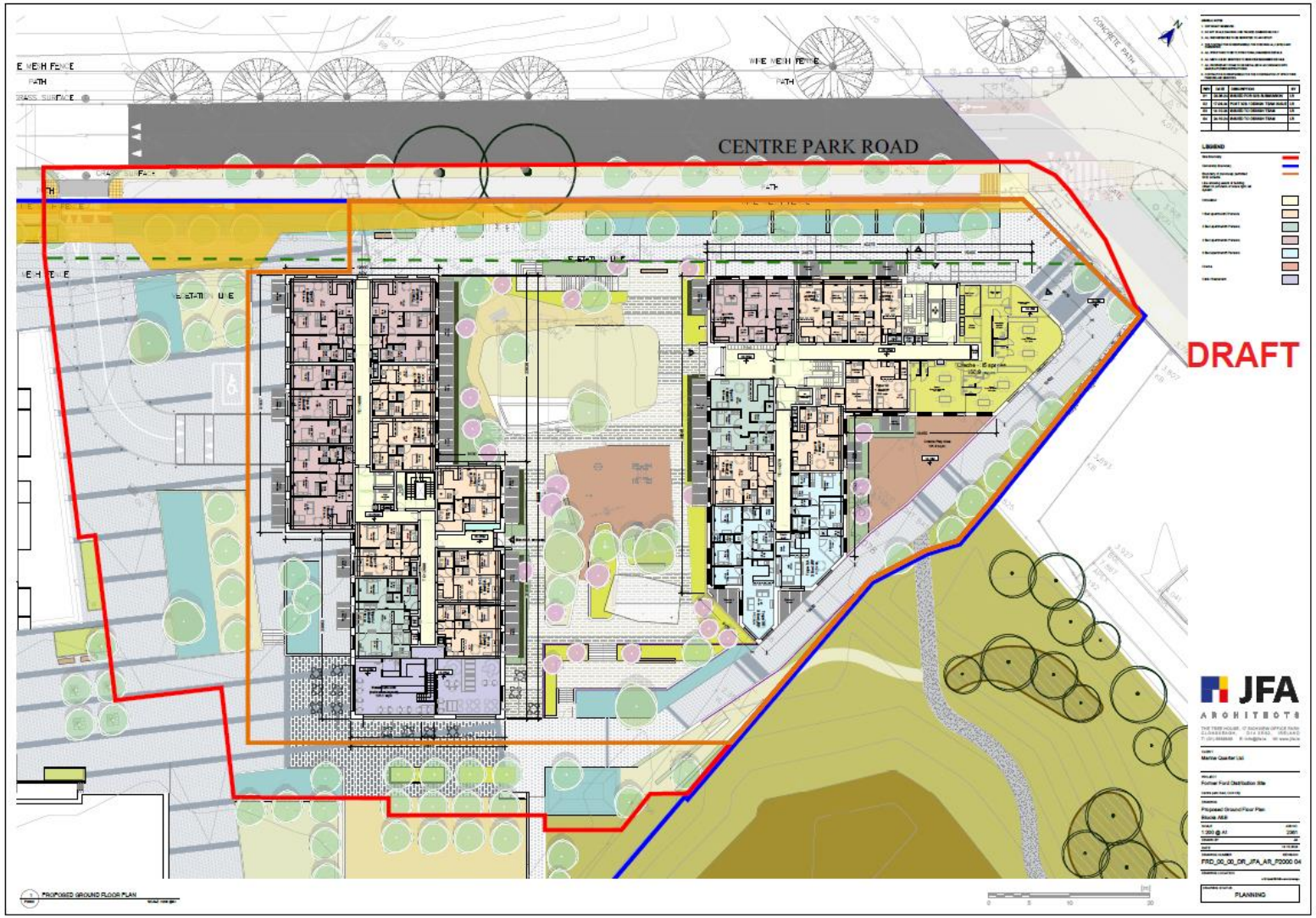

Figure 24: Proposed ground level plan showing the extensive ground level landscaping (received by RWDI on 30th October 2024)