



WIND MICROCLIMATE ASSESSMENT REPORT

LDA Wilton, Sarsfield Road LRD

7 February 2025

GIA No: 19691

PROJECT DATA:

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1 INTRODUCTION

This report outlines the results of a wind microclimate analysis for the Proposed Development at LDA Wilton, Sarsfield Road LRD.

1.1 EXECUTIVE SUMMARY

This report includes the results of a full wind microclimate assessment that was undertaken in August 2024 on the Section 32B Scheme. Since this date, the design of the Proposed Development has been updated. The Updated Proposed Development has also been tested, to demonstrate that the updates do not have a material impact on wind conditions, and are reported in Section 3.5

Wind microclimate conditions for the proposed LDA Wilton, Sarsfield Road LRD development were assessed using high resolution Computational Fluid Dynamics (CFD).

The Proposed Development will have a significant beneficial impact on conditions to the north of the site, eradicating a substantial amount of pre-existing wind safety risk around both the Tesco site and St Joseph's Church.

The following mitigation measures have been proposed and found to be sufficient to ensure that the Proposed Development does not have any adverse impact on wind conditions:

- The landscaping plan shown in Figures 20 and 28;
- 1.5m tall solid/glazed balustrade on balconies highlighted in Figure 21.

With the above measures included, wind conditions will be suitable for the intended use (or consistent with the baseline) for all thoroughfares, existing building entrances, proposed entrances, existing and proposed gardens, the proposed public realm at ground level, the proposed level 1 courtyard terraces and proposed balconies.

Conditions around the site will not be impacted by the inclusion of consented cumulative schemes.

1.2 GUIDANCE

The assessment was performed using the London Docklands Development Corporation (LDDC) variant of the Lawson Comfort Criteria. The Lawson Criteria are well-established in Ireland for quantifying wind conditions in relation to build developments and, although not an Irish 'standard', the criteria are recognised by local authorities as a suitable benchmark for wind assessments. The Lawson Criteria have been adopted for this assessment.

Urban Development and Building Heights Guidelines

Urban Development and Building Heights Guidelines for Planning Authorities (Government of Ireland, December 2020) states "specific wind impact assessment of the microclimatic effects should be performed for 'buildings taller than prevailing building heights in urban areas'. In the same guidance, standard buildings height is considered 6-8 storeys.

Cork City Development Plan

The Cork City Development Plan 2022-2028, (section 11.56. Environmental Impact and Impacts on Microclimate), states "Wind, daylight, sunlight penetration and temperature conditions around the building and neighbourhood must be carefully considered and not compromise comfort and the enjoyment of open spaces including water spaces around the building."

Section 11.92 of the Cork City Development Plan (Qualitative Considerations in the Design of Apartment Schemes) sets out standards for communal spaces within schemes. Whilst section 11.92 does not explicitly mention wind conditions, the wind comfort levels within communal spaces will be key to ensuring they are high quality spaces, and both the ground level (marked "PR" in Figure 4 and subsequent results figures) and podium level courtyards (marked "C1" and "C2" in Figure 4 and subsequent results figures) are assessed specifically within this report.

2 METHOD

To identify the likely effect of the Proposed Development on the pedestrian level wind environment, a 3D CFD model of the development and surrounding site was created. This section describes the methodology for the creation of this model and the inputs used.

2.1 ASSESSMENT METHODOLOGY

The assessment was performed using GIA's high-resolution Computational Fluid Dynamics (CFD) modelling.

CFD is a digital modelling technique, which simulates the effect of wind for the built environment. The air is divided into hundreds of millions of "cells", within which the equations of motion are solved. GIA uses cloud computing from Amazon Web Services (AWS) to run the simulations, to ensure vast scalability and appropriate resource availability for any project.

A full description of the test methodology is included in Appendix 01.

2.2 ESTABLISHING MICROCLIMATE CONDITIONS

Microclimate conditions were established using a high resolution CFD model, extending 400m radius from the Site.

A model of the development was included within the CFD model and tested to determine the conditions at and around the Site. The model used is shown in Figure 1, Figure 2 and Figure 3.

The model was run at full scale from 18 wind angles, spaced using 10° or 30° increments such that no sector contributes more than 10% of the annual wind. The wind angles which were run are indicated in Appendix 01.

Wind speeds were measured at 1.5m above any surfaces expected to be used for pedestrian activity.

On-site and local wind speeds were combined with wind statistics from 30 years of data recorded at Cork Airport for variations in terrain between the airport and the site, to obtain annual and seasonal frequency and magnitude of wind speeds across the model. This allows the 'grading' of the pedestrian level winds according to the Lawson Comfort Criteria, which are explained later in this report.

The mean correction factors between the site and the airport are shown in Table 1.

The wind microclimate effects are assessed annually, for the winter months (December, January and February) and for the summer months (June, July, August). Winter conditions are reported as this is the season when the strongest winds are expected, summer conditions are reported as this is the season when pedestrian usage of outdoor spaces is expected to be highest.

2.3 LIMITATIONS AND ASSUMPTIONS

The accuracy of the results is dependent upon the accuracy of the CAD used to construct the model.

The assessment herein is valid to the design as supplied to GIA at the time of the assessment, and does not cover future variations in the design.

There is an inherent assumption that on-site wind speeds will scale linearly with the measured wind speeds at the airport.

There is an inherent assumption that the wind speed statistics for the past 30 years will remain applicable for the foreseeable future.

Table 01: Site Wind Correction Factors

DIRECTION (°N)	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Corr. Factor	1.49	1.47	1.37	1.34	1.39	1.53	1.44	1.44	1.40	1.39	1.42	1.42



Fig. 01: 3D View of Section 32B Scheme



Fig. 02: 3D View of Updated Proposed Development



Fig. 03: Proposed Development with Existing Surrounds



Fig. 04: Sensitive Wind Receptors

2.4 LAWSON COMFORT AND SAFETY CRITERIA

The assessment was graded against the Lawson Comfort and Safety Criteria.

Table 2 and Table 3 show the banding of the various categories within the Lawson Comfort and Safety criteria.

Comfort categories are based on the level of wind speed exceedance for 5% of each season, and safety categories are based on the level of wind speed exceedance for 1.9 hours per year.

Table 02: 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 and terraces)
	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 03: Lawson Safety Criteria (LDDC variant)

KEY	SAFETY CATEGORY	MEAN WIND SPEED (0.025% 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

2.5 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 used to classify wind conditions is given below.

Any areas which show up as either 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.

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. The core entrances to the Proposed Development are marked “E” on Figure 4, and principal off-site entrances are marked “O”.

There is proposed public realm at ground level (marked “PR” in Figure 4). This is targeted to be suitable for leisure walking in winter and for a mixture of sitting and standing in summer.

There is external amenity in the form of existing residential gardens off site (marked “G1” in Figure 4) and proposed gardens (marked “G2”), as well as level 1 courtyard terraces for the west block and middle block (marked “C1” and “C2”) and balconies across the Proposed Development. These are targeted to be suitable for a mixture of sitting and standing in summer.

The locations of key sensitive receptors are shown in Figure 4.

2.6 TEST SCENARIOS

The purpose of these tests was to compare conditions with and without the Proposed Development.

The following scenarios were tested:

- Baseline: The existing building on site, with the existing surrounds (including any planning consented schemes which are under construction at the time of writing);
- Section 32B Scheme with Existing Surrounds: The completed and operational development with the existing surrounds; and
- Section 32B Scheme with Cumulative Surrounds: The completed and operational development with the existing surrounds plus local planning consented schemes; and
- Section 32B Scheme with Landscaping, Mitigation and Existing Surrounds: A scenario with proposed landscaping, retrained trees and wind mitigation measures included.
- Updated Proposed Development with Landscaping, Mitigation as Existing Surrounds: As above, but with an updated building massing and tree retention scheme.

Trees (either existing or proposed) and soft landscaping were not initially included (i.e. in Scenarios 1 to 3) to ensure worst-case results were captured.

For the cumulative assessment, the following consented scheme was included alongside the existing surrounds

- Cardinal Court (Cork City Council File No. 1838178)

A review of the planning history of surrounding lands was undertaken, all other consented schemes were either insufficiently close to the site to impact wind conditions, or consisted of modifications that did not substantially alter the external form of the relevant buildings.

3 RESULTS

3.1 BASELINE CONDITIONS

Annual safety at ground level for the baseline scenario is shown in Figure 5. Winter comfort at ground level for the baseline scenario is shown in Figure 6. Summer comfort at ground level for the baseline scenario is shown in Figure 7.

There are significant areas of S15 (distress) exceedance, off-site to the north of the site (especially within Tesco car park and outside St Joseph's Church). These would pose a pre-existing wind safety risk to cyclists or frail individuals, unrelated to the Proposed Development.

Winter conditions range between suitable for sitting, standing, leisure walking and business walking. Summer conditions range between suitable for sitting, standing and leisure walking.

There are no uncomfortable regions on any thoroughfares or roadways. This is suitable for the intended use.

The principal off-site entrances (marked "O" in results figures) range between suitable for sitting, standing and leisure walking in winter. This is between suitable for the intended use and up to one category windier than the target.

The off-site gardens (marked "G1" in results figures) off Cardinal Court to the west of the site are suitable for a mixture of sitting and standing in summer. This is suitable for the intended use.

The off-site gardens (marked "G1" in results figures) off Wilton Court to the east of the site are suitable for standing in summer. This is up to a category windier than the target condition.

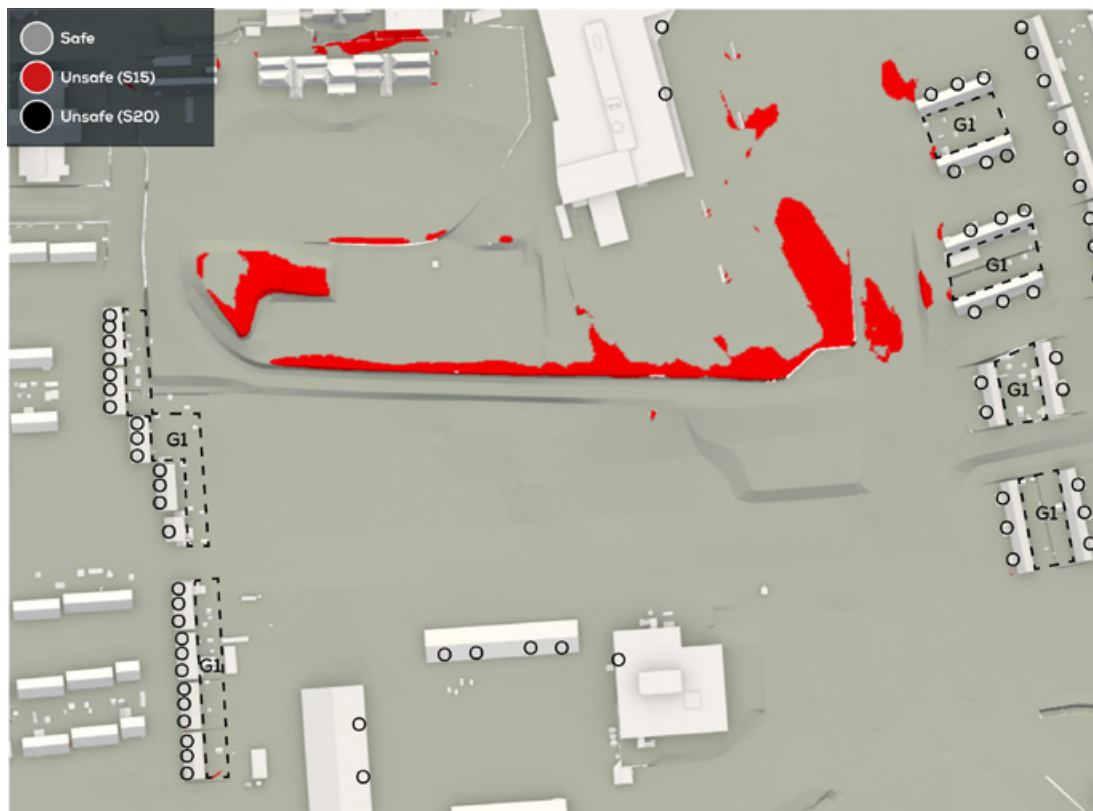


Fig. 05: Annual Safety at Ground Level, Baseline

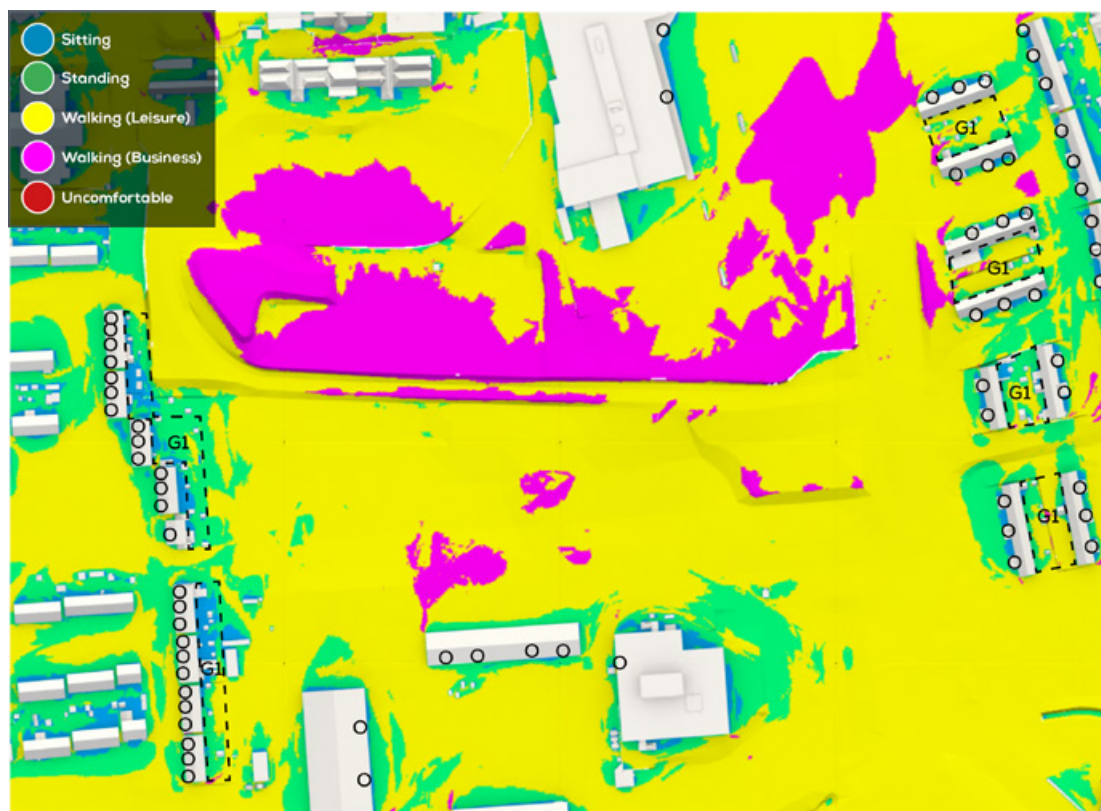


Fig. 06: Winter Comfort at Ground Level, Baseline

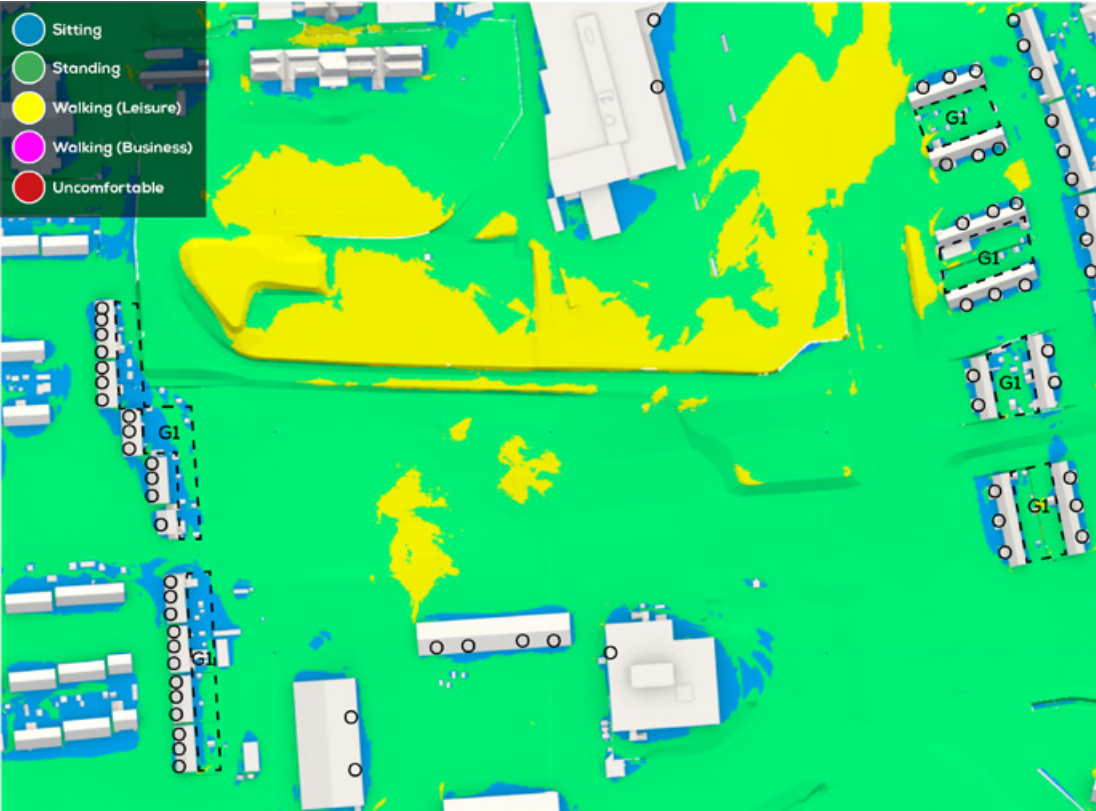


Fig. 07: Summer Comfort at Ground Level, Baseline

3.2 CONDITIONS FOR SECTION 32B SCHEME WITH EXISTING SURROUNDS

Annual safety at ground level for the Section 32B Scheme with existing surrounds is shown in Figure 8. Winter comfort at ground level for the Section 32B Scheme with existing surrounds is shown in Figure 9. Summer comfort at ground level for the Section 32B Scheme with existing surrounds is shown in Figure 10.

The significant off-site area of S15 (distress) exceedance, has been significantly reduced in extent, especially around the Tesco site directly north and by St Joseph's Church to the north west. This is a significant beneficial impact of the Section 32B Scheme.

Three regions of S15 (distress) exceedance (marked "1" on Figure 11) have been introduced within the site. These would pose a safety risk to cyclists or frail individuals and will require mitigation, these issues are caused by south westerly winds which are channelled between the blocks of the development and the mitigating impact of the proposed landscaping scheme on these issues is set out in Section 3.4.

Winter conditions range between suitable for sitting, standing, leisure walking and business walking. Summer conditions range between suitable for sitting, standing and leisure walking.

There are no uncomfortable regions on any thoroughfares or roadways. This is suitable for the intended use.

Conditions for the proposed entrances along the western elevation of the middle block are suitable for walking in winter. This is a category windier than the target condition. The mitigating impact of the proposed landscaping scheme on these issues is set out in Section 3.4.

All other principal proposed entrances (marked "E" in results figures) are suitable for either sitting or standing in all seasons. This is suitable for the intended use.

The principal off-site entrances (marked "O" in results figures) range between suitable for

sitting, standing and leisure walking in winter. This is between suitable for the intended use and up to one category windier than the target, but no entrance which is too windy was suitable in the baseline so any unsuitable conditions at off-site entrances are not attributable to the Section 32B Scheme.

Conditions for the proposed public realm within the site (marked "PR" on results figures) are suitable for a mix of sitting, standing, leisure walking and business walking in winter and for a mix of sitting, standing and leisure walking in summer. This is up to a category windier than the target condition. The mitigating impact of the proposed landscaping scheme on these issues is set out in Section 3.4.

The off-site gardens (marked "G1" in results figures) off Cardinal Court to the west of the site are suitable for a mixture of sitting and standing in summer. This is suitable for the intended use.

The off-site gardens (marked "G1" in results figures) off Wilton Court to the east of the site are suitable for either a mix of sitting and standing or for standing in summer. This is up to a category windier than the target condition, but is a marginal improvement when compared to the baseline conditions.

The proposed gardens (marked "G2" in results figures) are suitable for standing in summer. This is a category windier than the target condition. The mitigating impact of the proposed landscaping scheme on these issues is set out in Section 3.4.

Conditions for the level 1 courtyard terraces (marked "C2" and "C2" in results figures) are suitable for a mixture of sitting and standing summer, this is suitable for the intended use.

Annual safety at balcony level for the Section 32B Scheme with existing surrounds is shown in Figure 11. Winter comfort at balcony level for the Section 32B Scheme with existing surrounds is shown in Figure 12. Summer comfort at balcony level for the Section 32B Scheme with existing surrounds is shown in Figure 13.

There are a number of balconies with small areas of S15 (distress) exceedance. These would pose a safety risk and will require mitigation (which is set out in section 3.4).

Figures 12 and 13 show that there are no balconies which show up as “uncomfortable” (red) in any season.

Those balconies which are subject to safety exceedances are also subject to summer conditions which are not suitable for sitting or standing.



Fig. 08: Annual Safety at Ground Level, Section 32B Scheme with Existing Surrounds

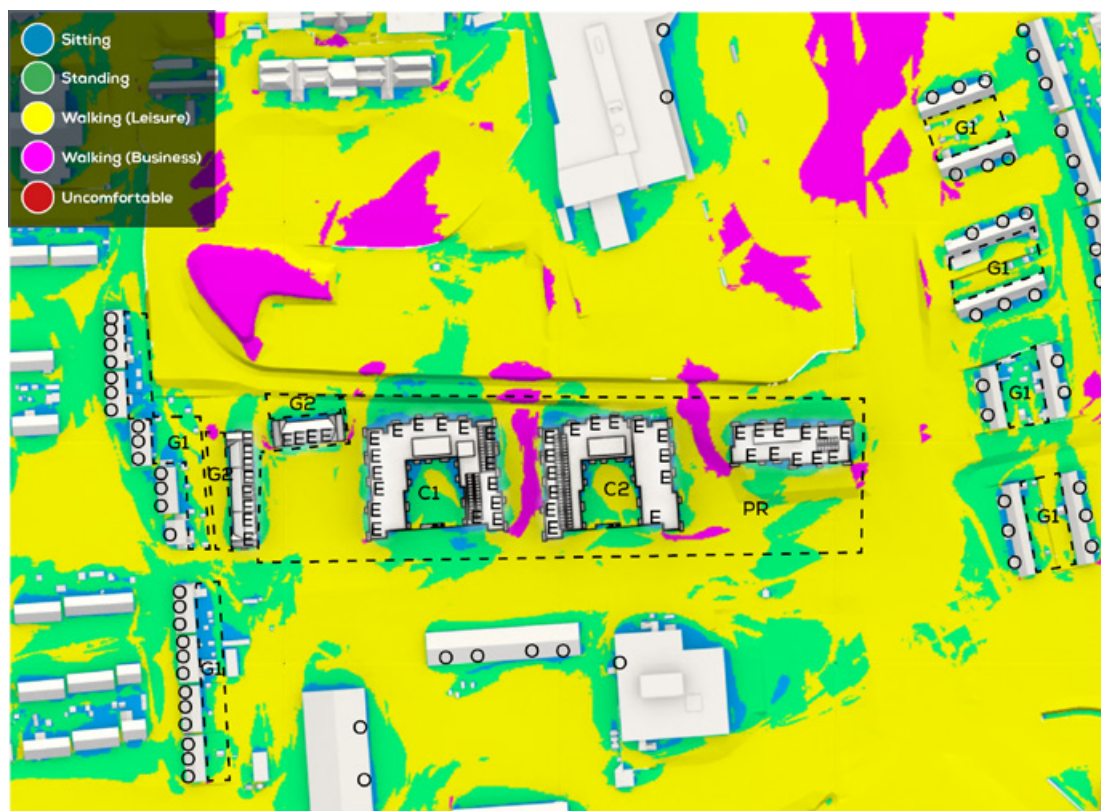


Fig. 09: Winter Comfort at Ground Level, Section 32B Scheme with Existing Surrounds

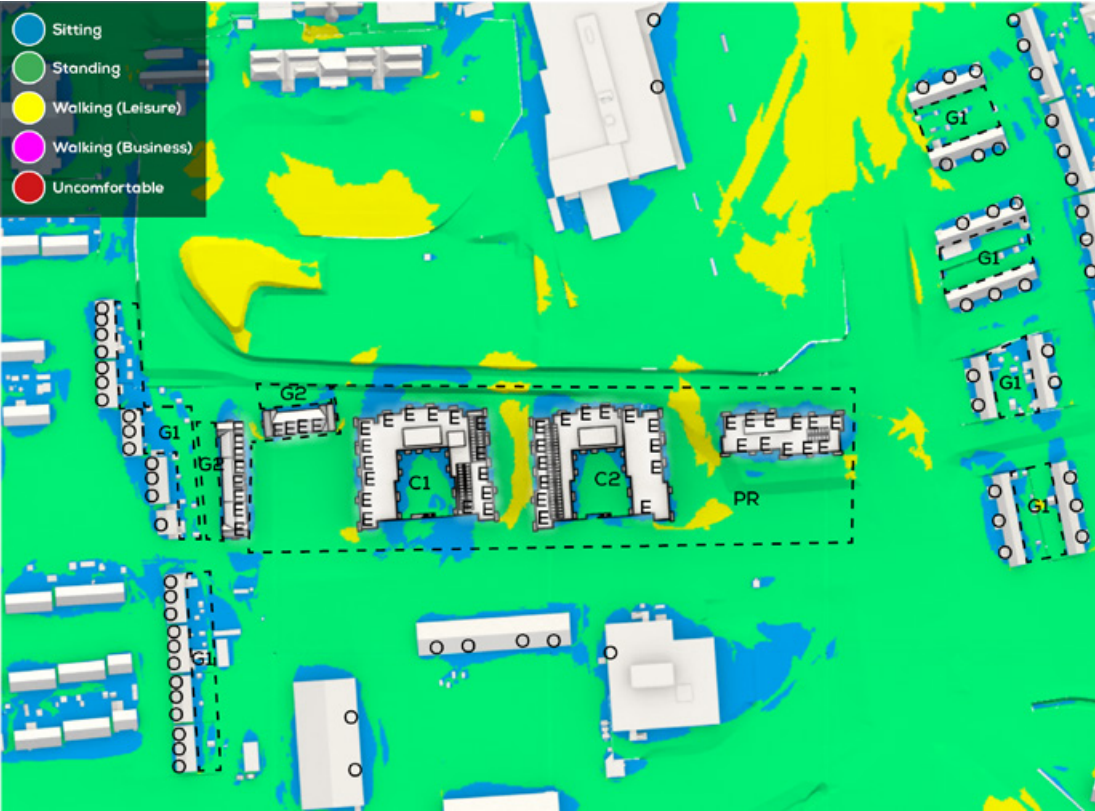


Fig. 10: Summer Comfort at Ground Level, Section 32B Scheme with Existing Surrounds

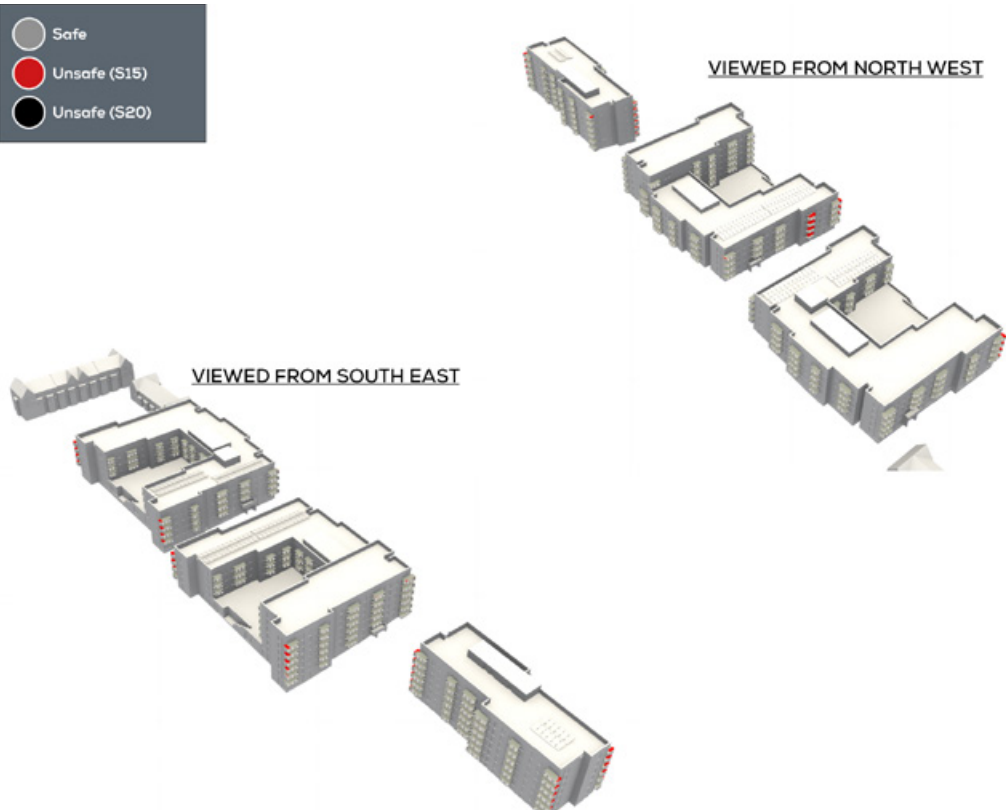


Fig. 11: Annual Safety at Balcony Level, Section 32B Scheme with Existing Surrounds

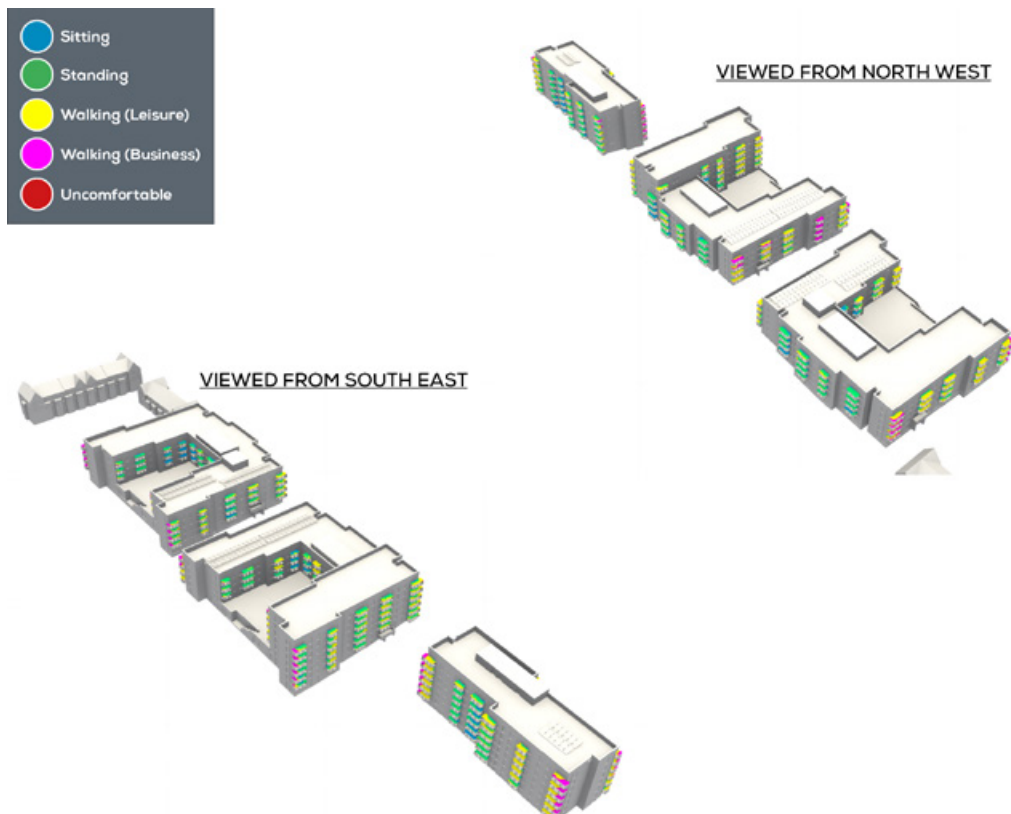


Fig. 12: Winter Comfort at Balcony Level, Section 32B Scheme with Existing Surrounds

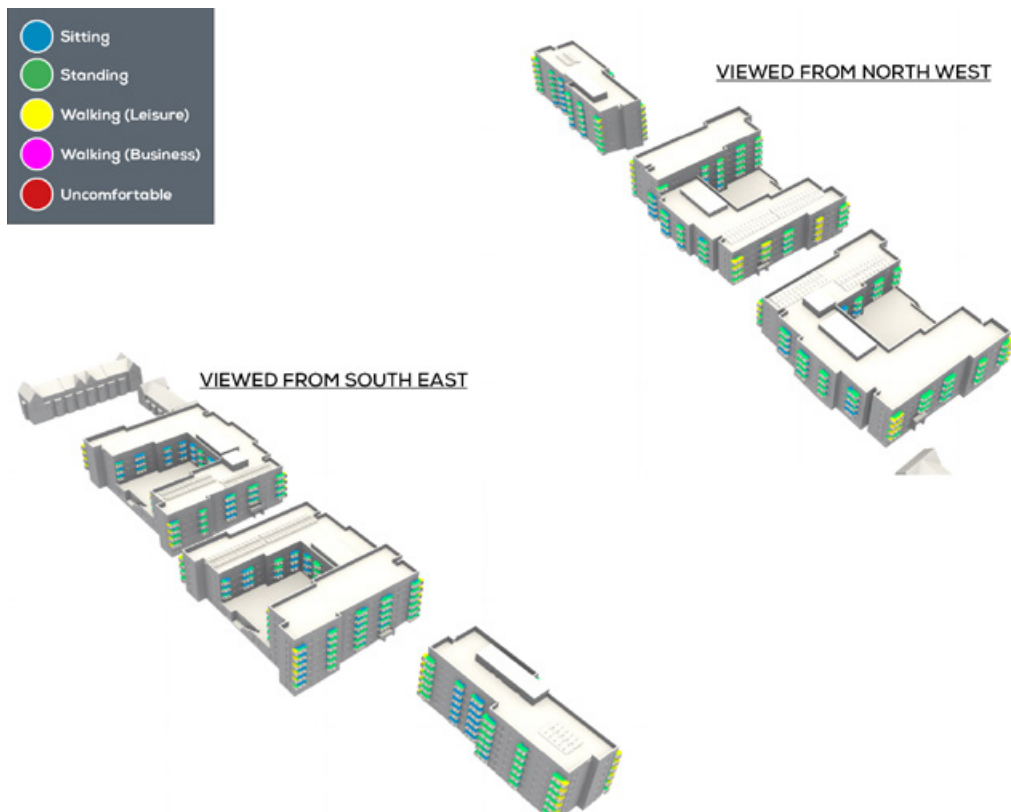


Fig. 13: Summer Comfort at Balcony Level, Section 32B Scheme with Existing Surrounds

3.3 CONDITIONS FOR SECTION 32B SCHEME WITH CUMULATIVE SURROUNDS

The cumulative surrounds (as set out in Section 2.6) consist of the existing surrounds plus local planning consented schemes.

Annual safety at ground level for the Section 32B Scheme with cumulative surrounds is shown in Figure 14. Winter comfort at ground level for the Section 32B Scheme with cumulative surrounds is shown in Figure 15. Summer comfort at ground level for the Section 32B Scheme with cumulative surrounds is shown in Figure 16.

There are no material differences in ground level conditions when compared to the scenario for the Section 32B Scheme with existing surrounds (i.e. comparing Figures 14 to 16 with Figures 8 to 10) and the suitability of all receptors is unchanged.

Annual safety at balcony level for the Section 32B Scheme with cumulative surrounds is shown in Figure 17. Winter comfort at balcony level for the Section 32B Scheme with cumulative surrounds is shown in Figure 18. Summer comfort at balcony level for the Section 32B Scheme with cumulative surrounds is shown in Figure 19.

There are no material differences in balcony level conditions when compared to the scenario for the Section 32B Scheme with existing surrounds (i.e. comparing Figures 17 to 19 with Figures 11 to 13) and the suitability of all receptors is unchanged.



Fig. 14: Annual Safety at Ground Level, Section 32B Scheme with Cumulative Surrounds

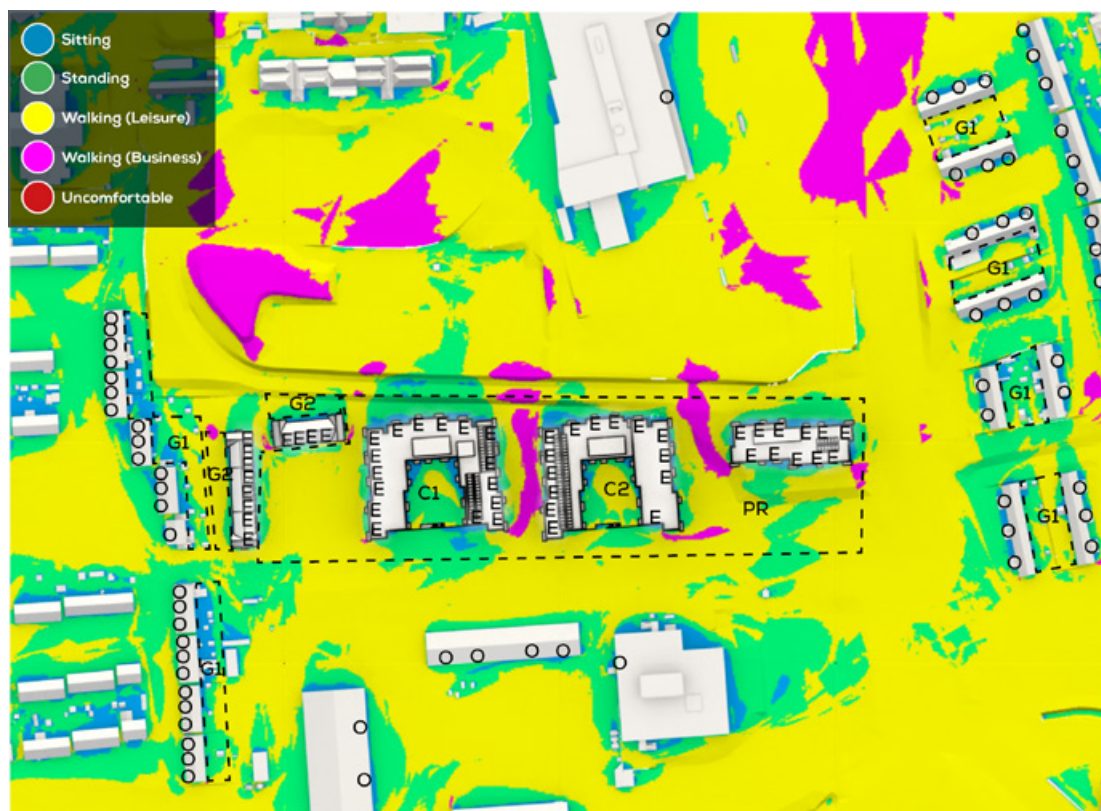


Fig. 15: Winter Comfort at Ground Level, Section 32B Scheme with Cumulative Surrounds

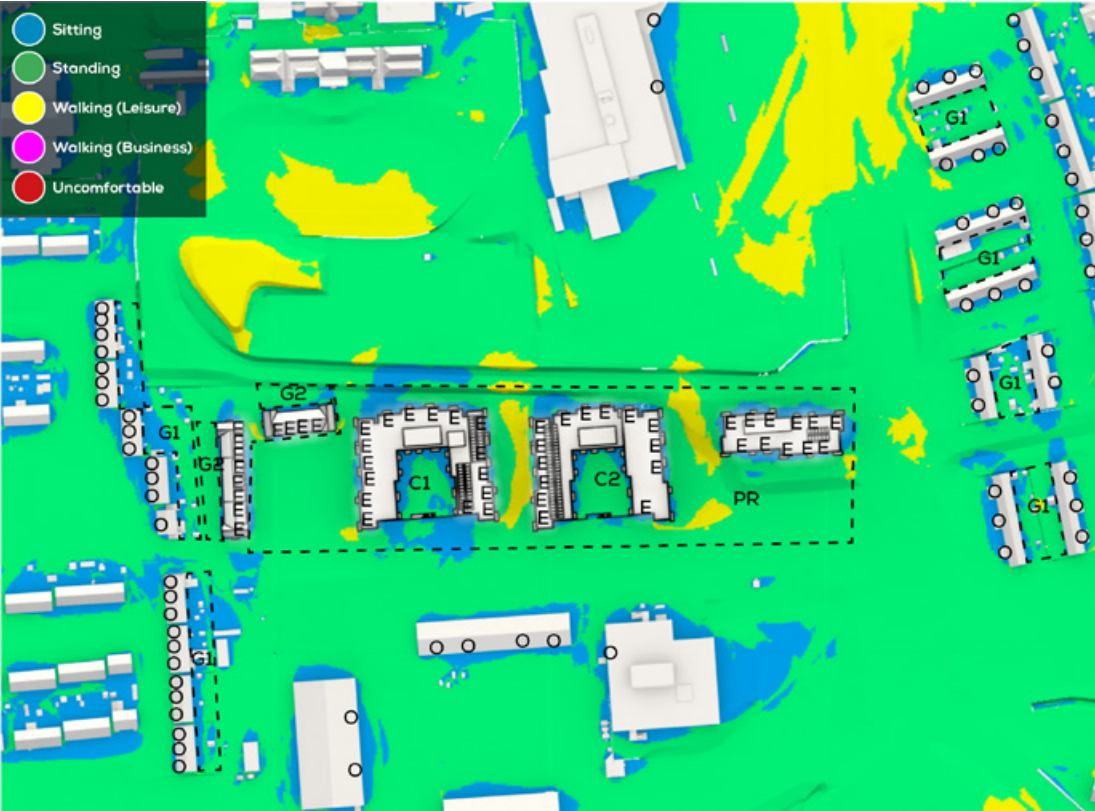


Fig. 16: Summer Comfort at Ground Level, Section 32B Scheme with Cumulative Surrounds

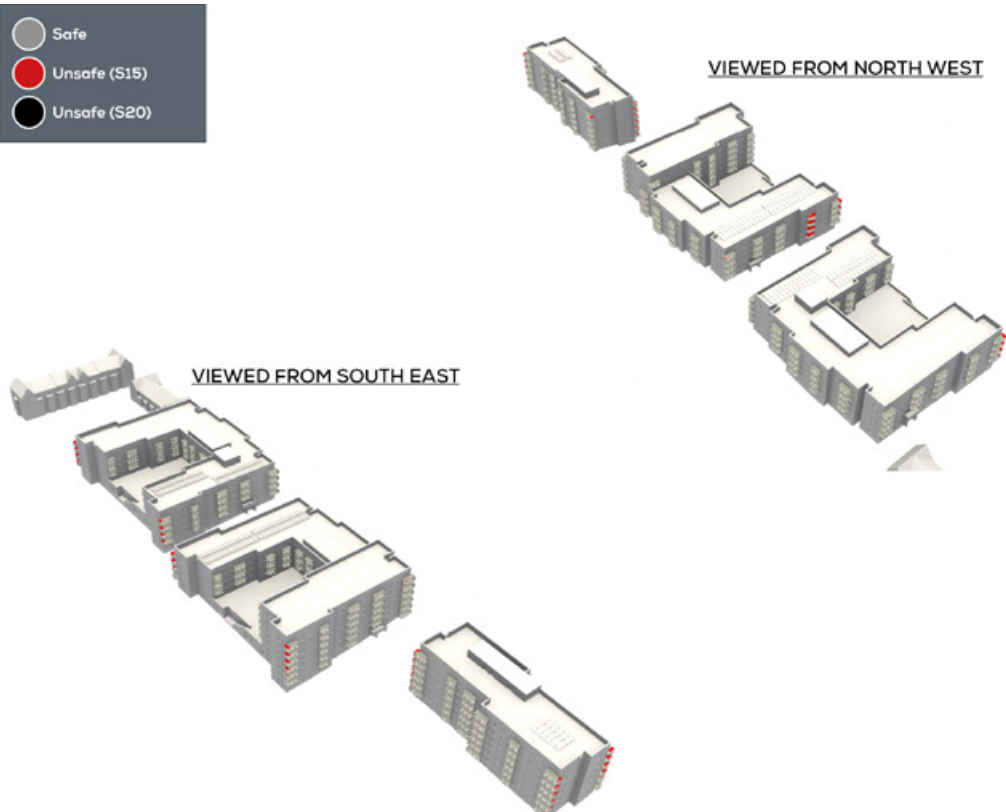


Fig. 17: Annual Safety at Balcony Level, Section 32B Scheme with Cumulative Surrounds

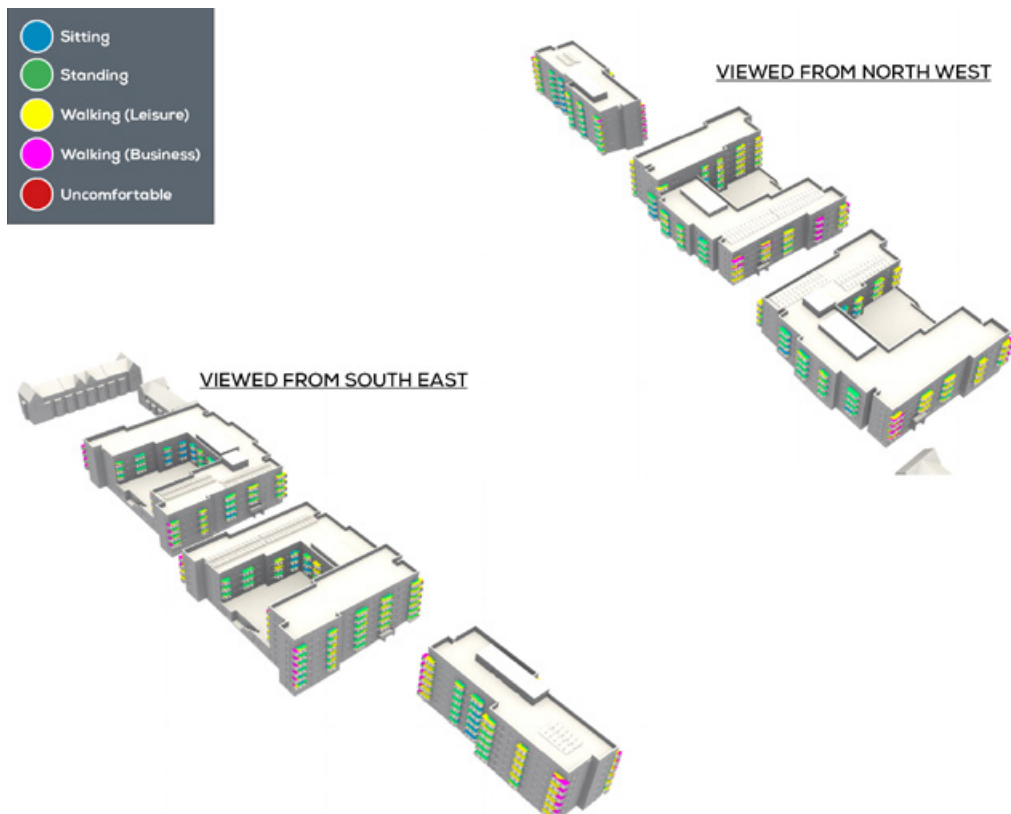


Fig. 18: Winter Comfort at Balcony Level, Section 32B Scheme with Cumulative Surrounds

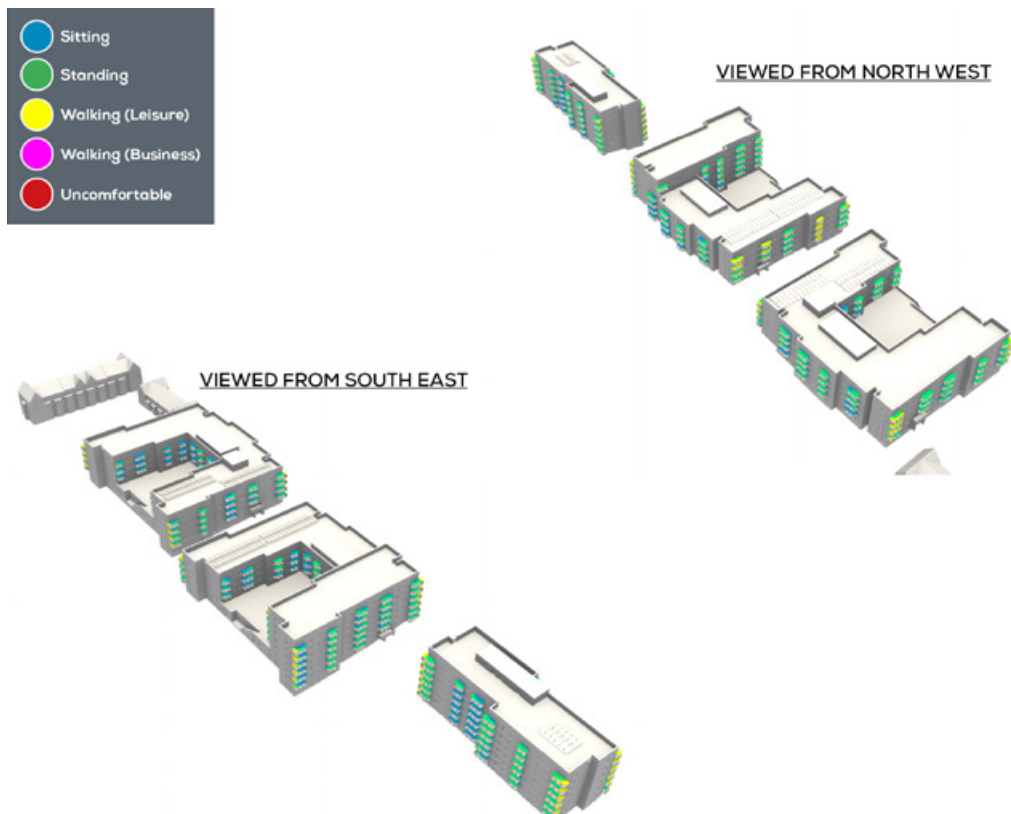


Fig. 19: Summer Comfort at Balcony Level, Section 32B Scheme with Cumulative Surrounds

3.4 CONDITIONS FOR SECTION 32B SCHEME WITH LANDSCAPING, MITIGATION AND EXISTING SURROUNDS

Landscaping and Mitigation

Mitigation was required for the following on-site conditions:

- Potential wind safety risks at ground level within the site;
- Comfort conditions for the entrances to the western elevation of the middle block;
- Comfort conditions for the proposed public realm;
- Comfort conditions for the proposed gardens; and
- Safety and comfort for the proposed balconies.

The following features were included in the design of the scheme and were tested as wind mitigation measures for the above conditions:

- Proposed and retained trees were included in the model, in accordance with the layout shown in Figure 20.
- The balconies that required mitigation were fitted with 1.5m tall solid/glazed side panels down one side. The locations of the balconies which were fitted with these panels are shown in Figure 21.

Wind Conditions

Annual safety at ground level for the Section 32B Scheme with landscaping, mitigation and existing surrounds is shown in Figure 22. Winter comfort at ground level for the Section 32B Scheme with landscaping, mitigation and existing surrounds is shown in Figure 23. Summer comfort at ground level for the Section 32B Scheme with landscaping, mitigation and existing surrounds is shown in Figure 24.

Annual safety at balcony level for the Section 32B Scheme with landscaping, mitigation and existing surrounds is shown in Figure 25. Winter comfort at balcony level for the Section 32B Scheme with landscaping,

mitigation and existing surrounds is shown in Figure 26. Summer comfort at balcony level for the Section 32B Scheme with landscaping, mitigation and existing surrounds is shown in Figure 27.

All conditions which were suitable (or consistent with the baseline) in the absence of landscaping and mitigation measures would remain suitable (or consistent with the baseline). Those receptors which were previously not suitable are outlined below.

The three on-site safety exceedances have now been eradicated, and there are no significant wind safety risks within the site.

Conditions for the proposed entrances along the western elevation of the middle block are suitable for standing in winter. This is now suitable for the intended use.

Conditions for the proposed public realm within the site (marked "PR" on results figures) are suitable for a mix of sitting, standing, leisure walking (with one highly localised region which is suitable for business walking between the western and middle blocks, which is not sufficiently extensive to harm the use of the space) in winter and for a mix of sitting and standing in summer. This is now suitable for the intended use.

The proposed gardens (marked "G2" in results figures) are suitable for a mix of sitting and standing in summer. This is now suitable for the intended use.

The inclusion of the side panels on the balconies is sufficient to eradicate all safety exceedances and made conditions suitable for a mixture of sitting and standing in summer. This is now suitable for the intended use

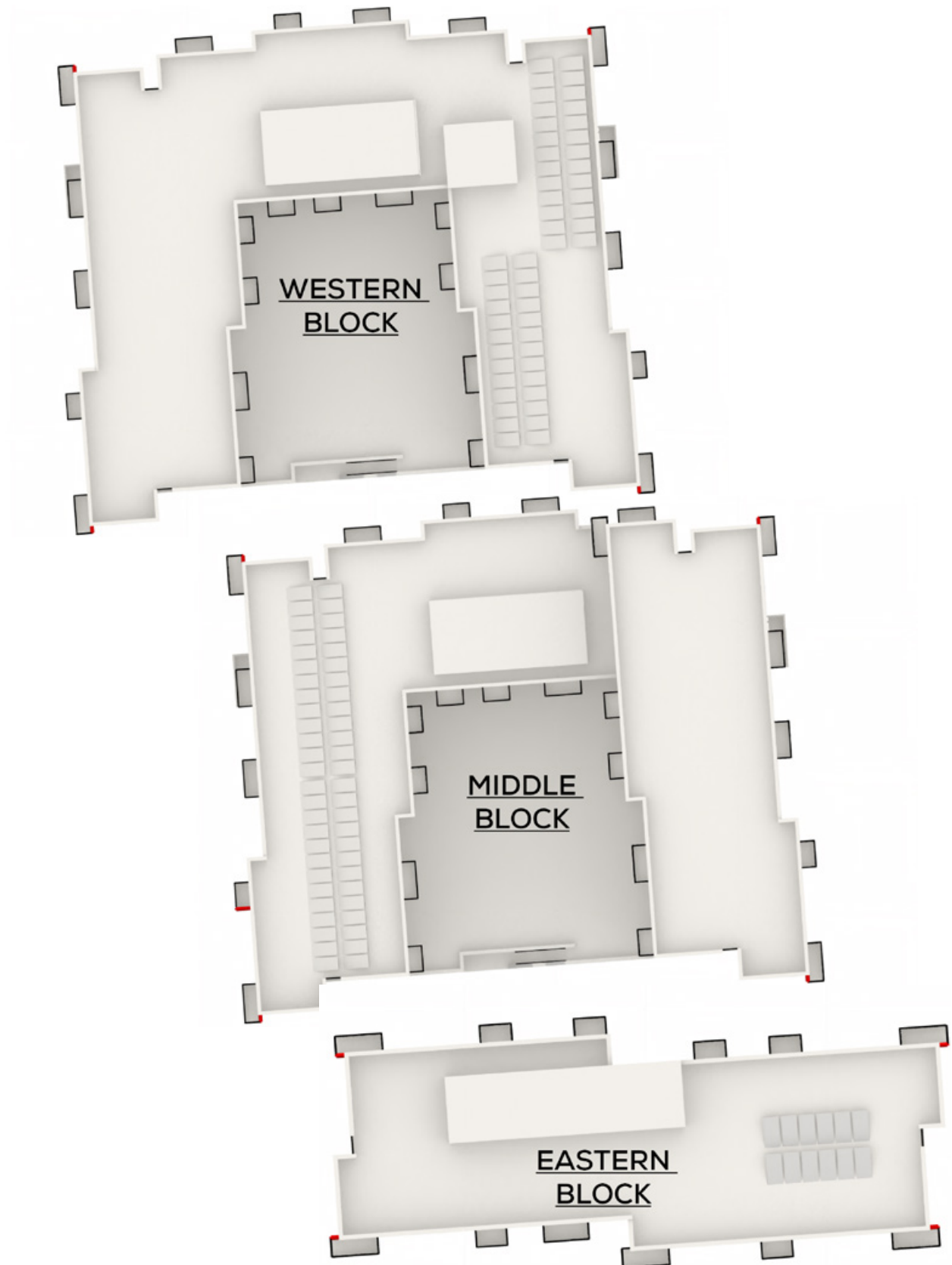


Fig. 21: Locations of 1500mm Solid/Glazed Balcony Side Panels (added to all balconies within relevant columns)



Fig. 22: Annual Safety at Ground Level, Section 32B Scheme with Landscaping, Mitigation and Existing Surrounds

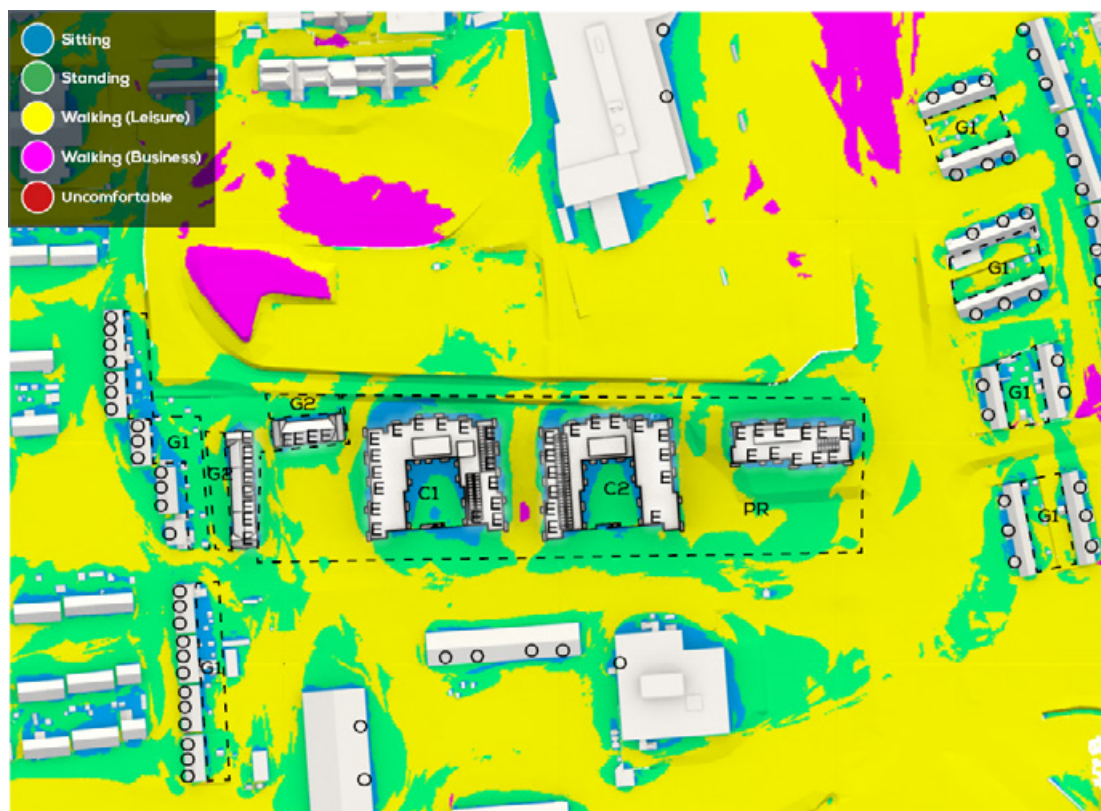


Fig. 23: Winter Comfort at Ground Level, Section 32B Scheme with Landscaping, Mitigation and Existing Surrounds

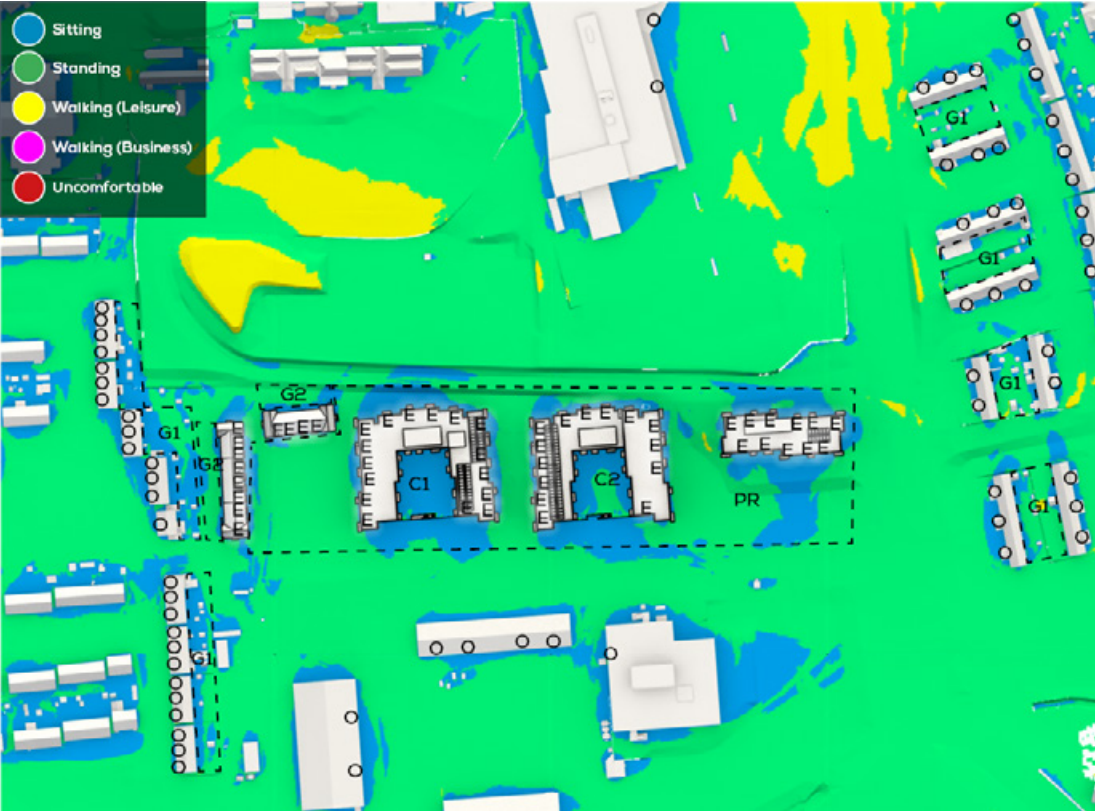


Fig. 24: Summer Comfort at Ground Level, Section 32B Scheme with Landscaping, Mitigation and Existing Surrounds

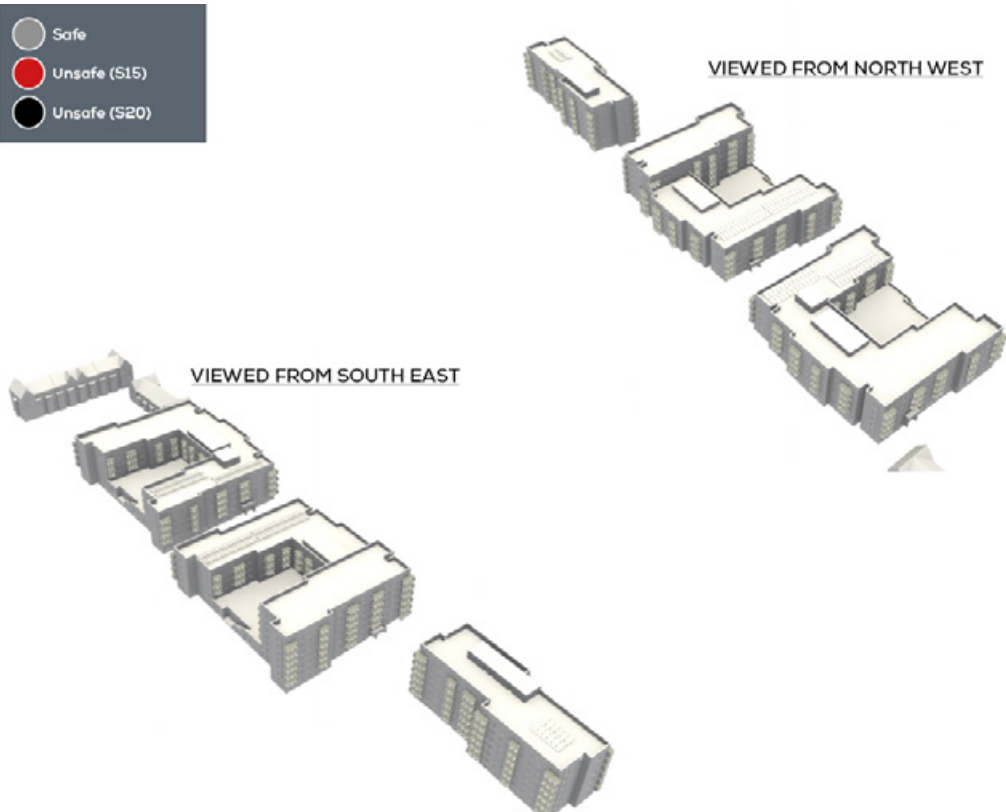


Fig. 25: Annual Safety at Balcony Level, Section 32B Scheme with Landscaping, Mitigation and Existing Surrounds

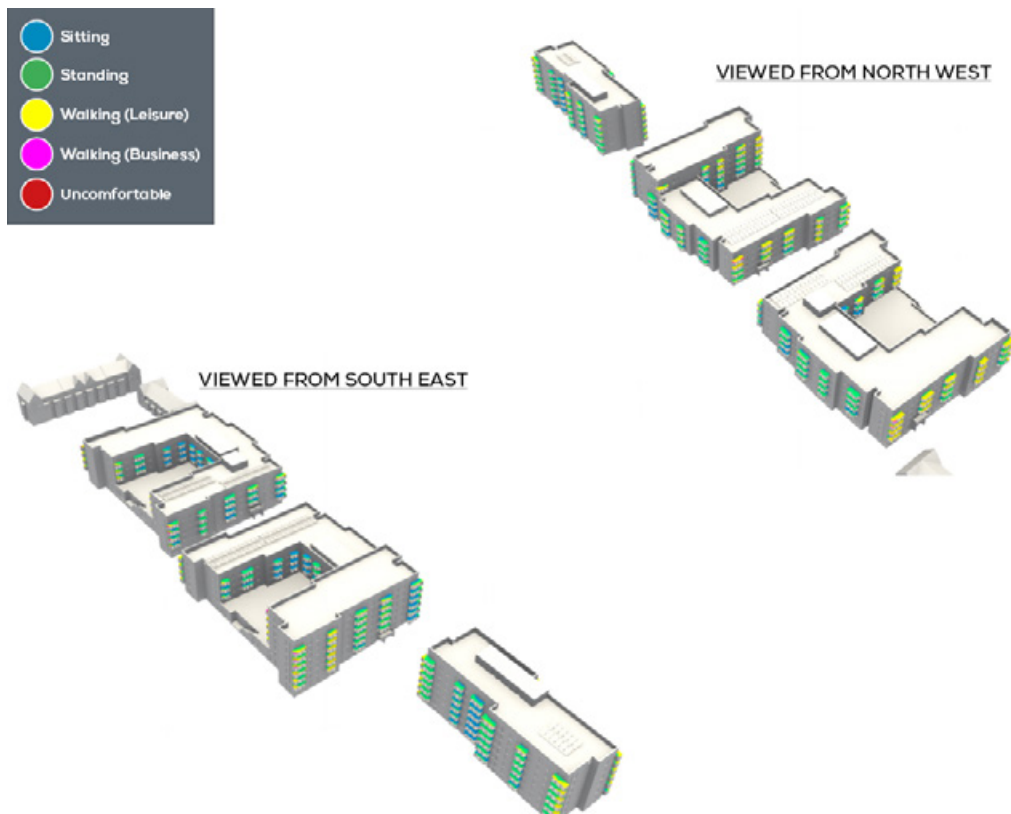


Fig. 26: Winter Comfort at Balcony Level, Section 32B Scheme with Landscaping, Mitigation and Existing Surrounds

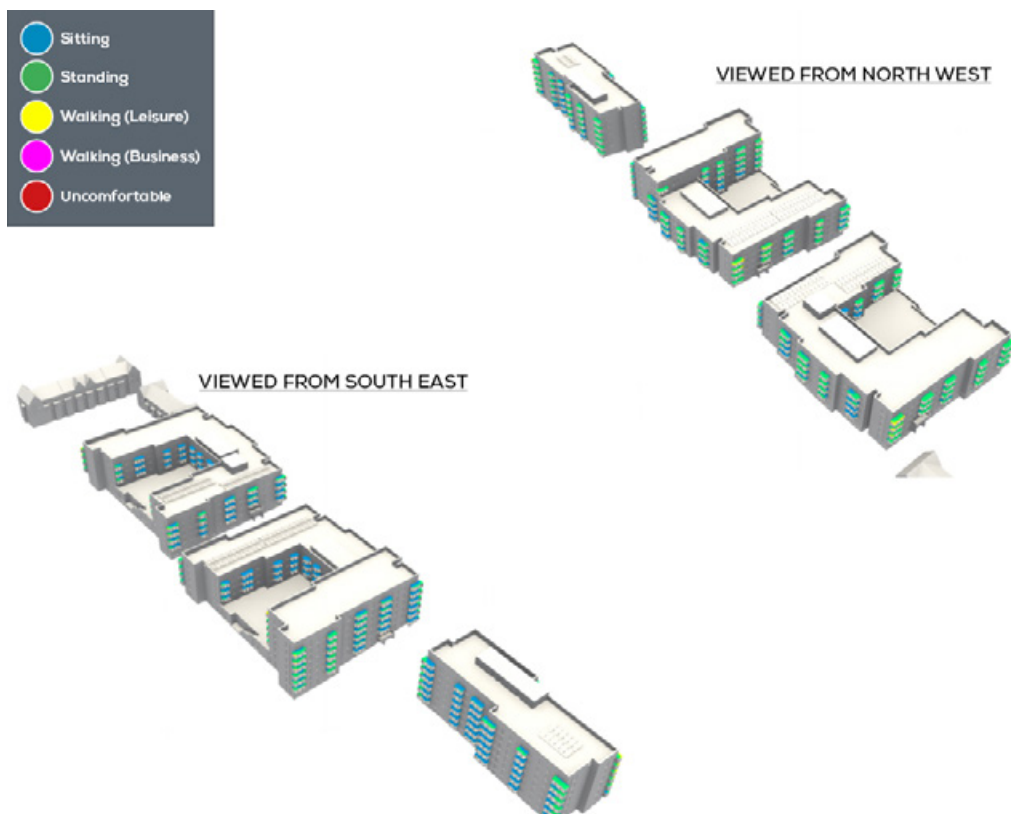


Fig. 27: Summer Comfort at Balcony Level, Section 32B Scheme with Landscaping, Mitigation and Existing Surrounds

3.5 CONDITIONS FOR UPDATED PROPOSED DEVELOPMENT WITH LANDSCAPING, MITIGATION AND EXISTING SURROUNDS

Updates

In December 2024, the following updates were proposed relative to the Section 32B Scheme:

- Changes to the massing to that shown in Figure 3; and
- Update to the tree retention strategy to be as shown in Figure 28.

All other factors (surrounding context, mitigation measures and proposed landscaping) were as tested in Section 3.4

Wind Conditions

Annual safety at ground level for the Updated Proposed Development with landscaping, mitigation and existing surrounds is shown in Figure 29. Winter comfort at ground level for the Updated Proposed Development with landscaping, mitigation and existing surrounds is shown in Figure 30. Summer comfort at ground level for the Updated Proposed Development with landscaping, mitigation and existing surrounds is shown in Figure 31.

Annual safety at balcony level for the Updated Proposed Development with landscaping, mitigation and existing surrounds is shown in Figure 32. Winter comfort at balcony level for the Updated Proposed Development with landscaping, mitigation and existing surrounds is shown in Figure 33. Summer comfort at balcony level for the Updated Proposed Development with landscaping, mitigation and existing surrounds is shown in Figure 34.

It is apparent that the conditions are not materially different to those reported in Section 3.4 for the Section 32B Scheme, and the suitability of conditions is unchanged.



Fig. 28: Updated Landscape Retention Scheme



Fig. 29: Annual Safety at Ground Level, Updated Proposed Development with Landscaping, Mitigation and Existing Surrounds

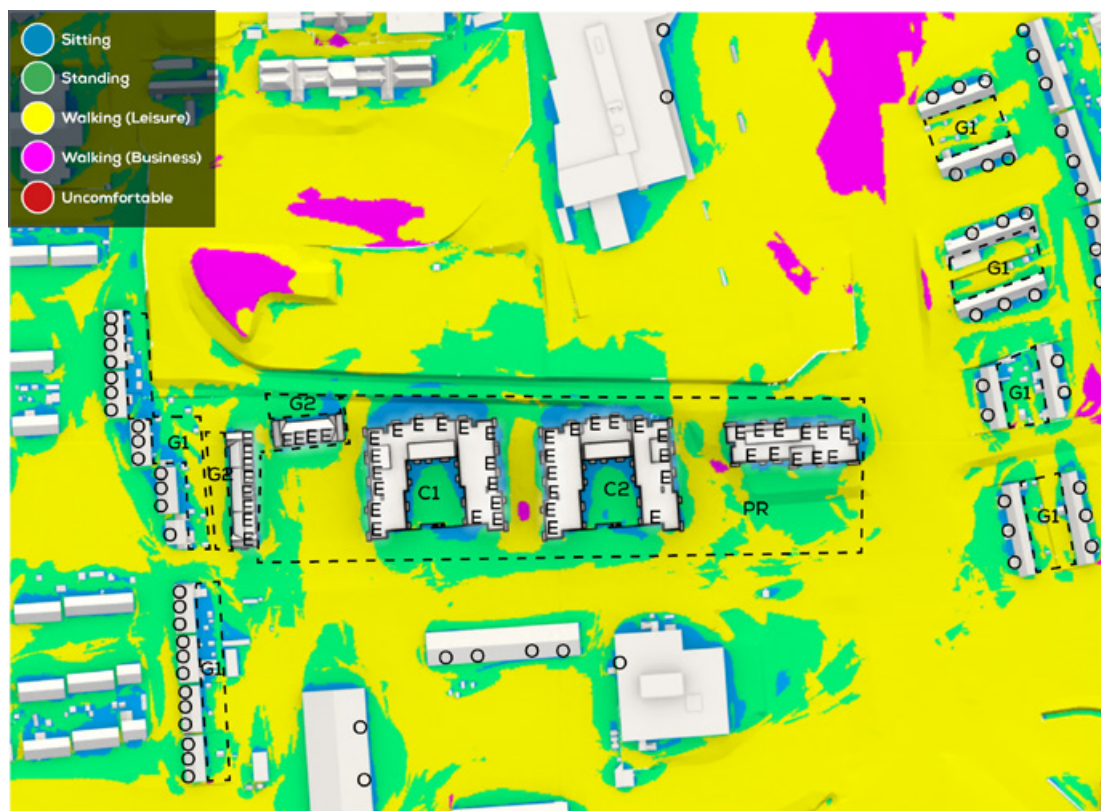


Fig. 30: Winter Comfort at Ground Level, Updated Proposed Development with Landscaping, Mitigation and Existing Surrounds

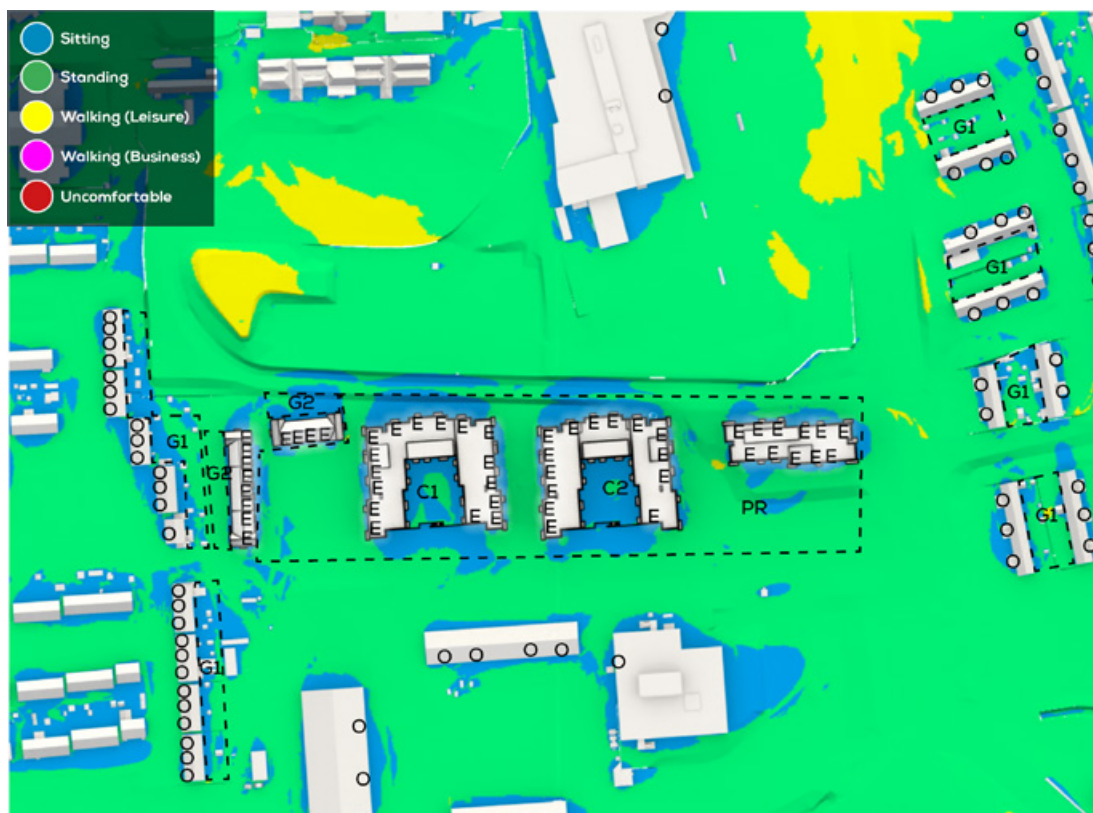


Fig. 31: Summer Comfort at Ground Level, Updated Proposed Development with Landscaping, Mitigation and Existing Surrounds

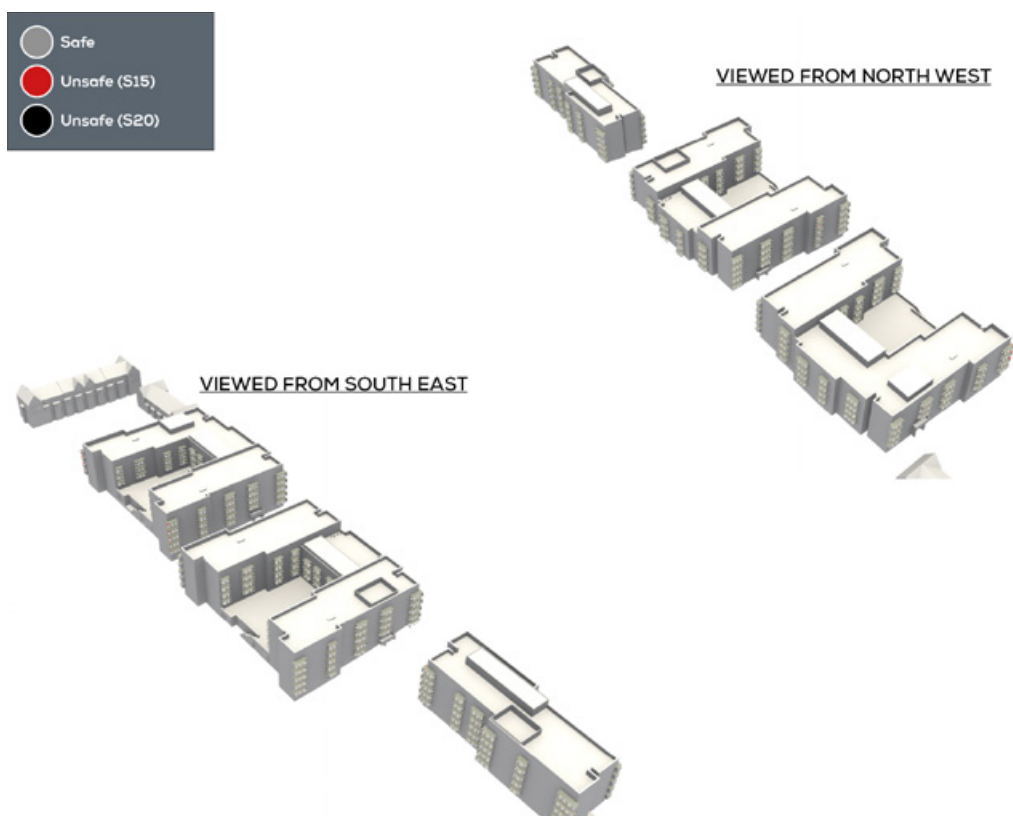


Fig. 32: Annual Safety at Balcony Level, Updated Proposed Development with Landscaping, Mitigation and Existing Surrounds

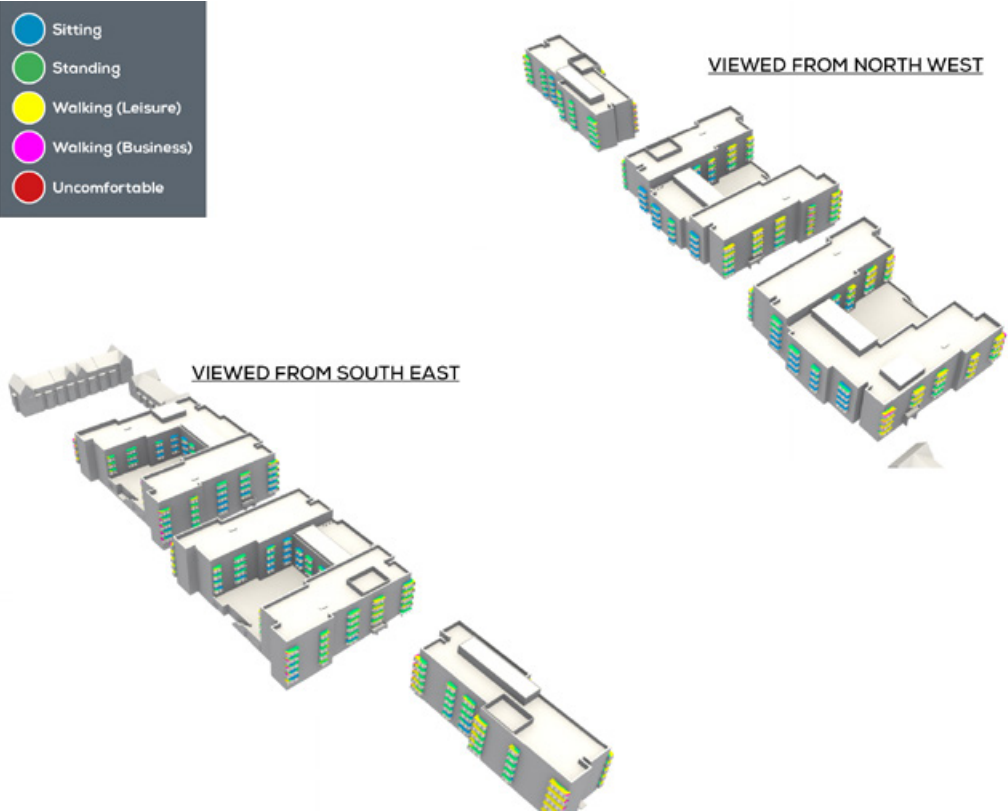


Fig. 33: Winter Comfort at Balcony Level, Updated Proposed Development with Landscaping, Mitigation and Existing Surrounds

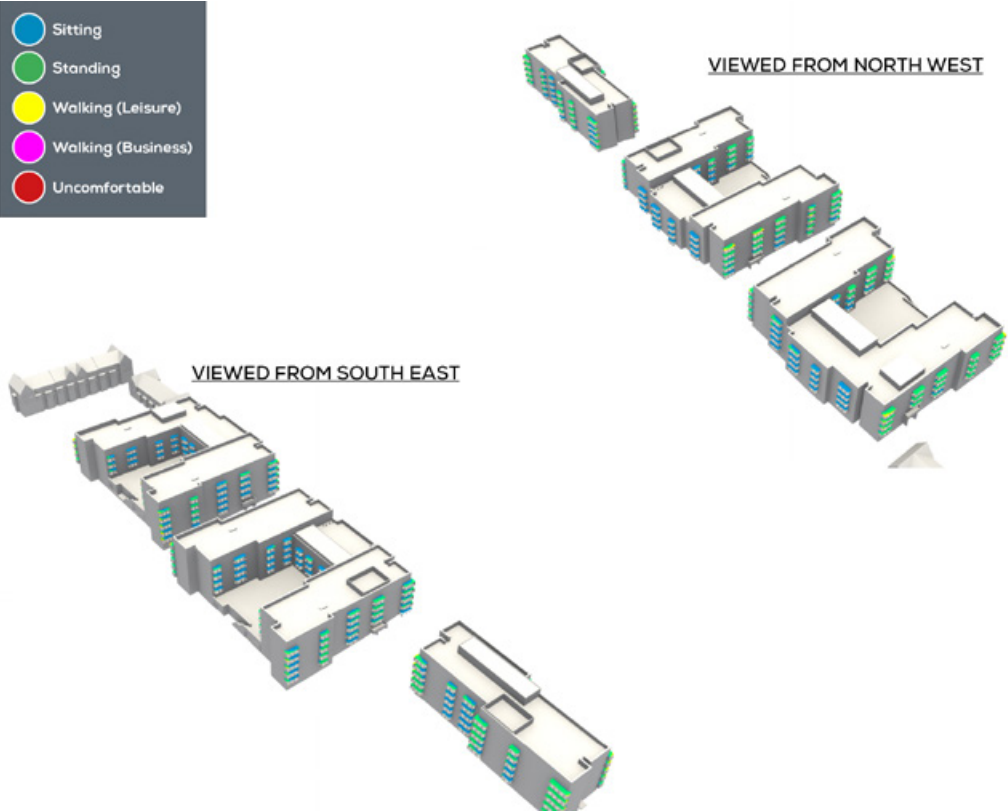


Fig. 34: Summer Comfort at Balcony Level, Updated Proposed Development with Landscaping, Mitigation and Existing Surrounds

4 CONCLUSIONS

Wind microclimate conditions for the proposed LDA Wilton, Sarsfield Road LRD development were assessed using high resolution Computational Fluid Dynamics (CFD).

The Proposed Development will have a significant beneficial impact on conditions to the north of the site, eradicating a substantial amount of pre-existing wind safety risk around both the Tesco site and St Joseph's Church.

The following mitigation measures have been proposed and found to be sufficient to ensure that the Proposed Development does not have any adverse impact on wind conditions:

- The landscaping plan shown in Figures 20 and 28;
- 1.5m tall solid/glazed balustrade on balconies highlighted in Figure 21.

With the above measures included, wind conditions will be suitable for the intended use (or consistent with the baseline) for all thoroughfares, existing building entrances, proposed entrances, existing and proposed gardens, the proposed public realm at ground level, the proposed level 1 courtyard terraces and proposed balconies.

Conditions around the site will not be impacted by the inclusion of consented cumulative schemes.

APPENDIX 01 DETAILED METHODOLOGY

CFD METHODOLOGY

The CFD was performed using OpenFOAM.

Meshed using a hybrid mesh of hexahedral, polyhedral, tetrahedral and prismatic elements:

- On site building edge length: 0.05m – 0.25m
- Surrounding context edge length: 0.25m – 1m

Prismatic cells were used in the boundary layer region, with 4 layers of cells growing with an expansion ratio of 1.15 and aspect ratios between 0.1 and 0.4.

The total mesh size was between 66 and 81 million cells. Mesh detail is shown in Figure 35 and Figure 36.

Buildings within 400m of the site were included.

The domain was 5000mx5000m, with a blockage ratio of 0.5%

The blockage ratio uses a “test section” of 600mx200m (within which detail is captured).

Run using the SST turbulence model with high Re wall functions to ensure mesh suitability.

The simulations were steady state and isothermal.

2nd order discretisation schemes were used.

Convergence was measured as the residuals of the continuity, x-velocity, y-velocity, z-velocity, k and omega equations all falling by at least 2 orders of magnitude, and by measured static pressure on the site buildings varying by less than 1% over the final 100 iterations.

The wind speed is corrected into a “gust-equivalent” mean. The gust-equivalent mean is calculated using an empirical relationship between the gust and mean ratios recorded at over 13,000 data points from wind tunnel tests. This method is found to give a significant correlation improvement over the more traditional methods based on the CFD turbulent kinetic energy field.

WIND CLIMATE METHODOLOGY

The simulations were performed from 18 wind directions, spaced such that no single direction contributed more than 10% of the annual winds.

The directions simulated were 0°, 30°, 60°, 90°, 120°, 150°, 180°, 200°, 210°, 220°, 230°, 240°, 250°, 260°, 270°, 280°, 300°, 330°.

Seasonal wind roses for Cork Airport are shown in Figure 37.

Target wind profiles for the site, from each wind direction, were generated using sectoral analysis of the terrain surrounding the site and the local weather stations with ESDU 2010 Item 01008 ‘Computer program for wind speeds and turbulent properties: flat or hilly sites in terrain with roughness changes’. The target wind profiles, compared to the wind speeds measured from the CFD model are shown in Figure 38.

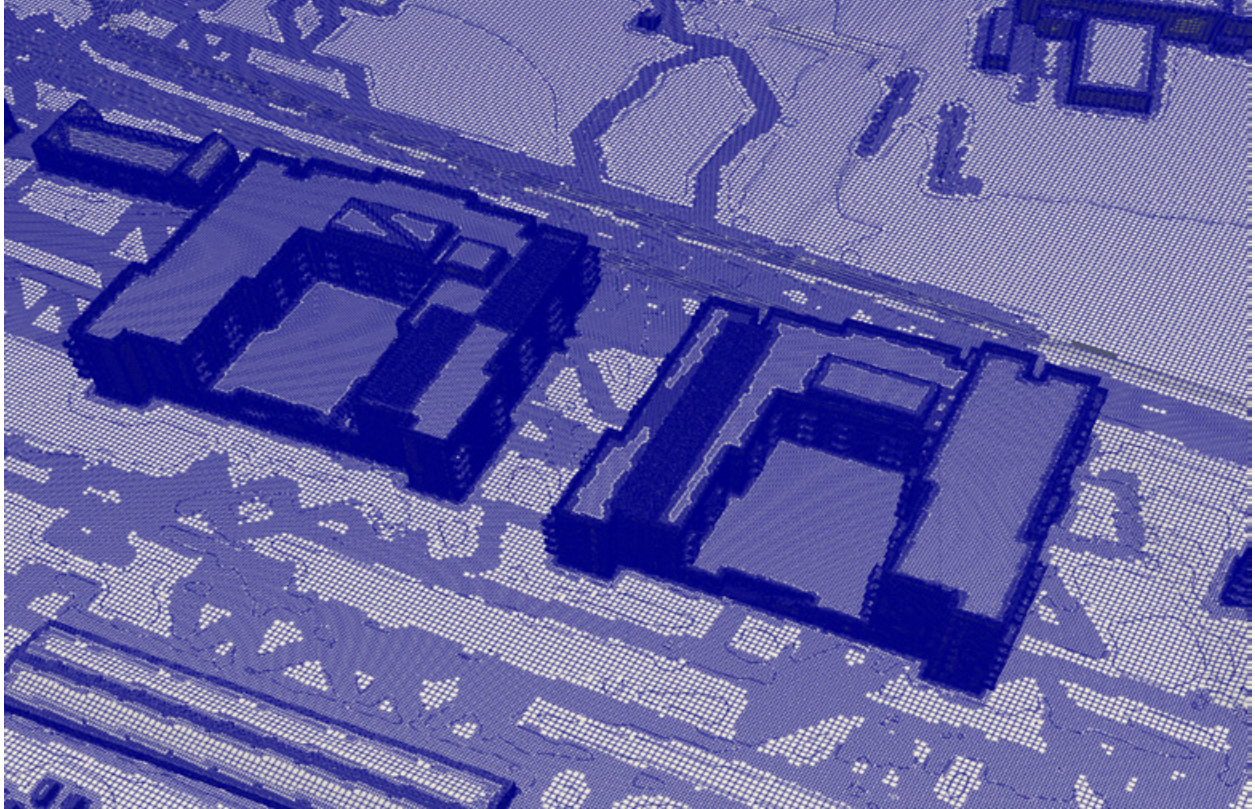


Fig. 35: Mesh Detail on Site Buildings

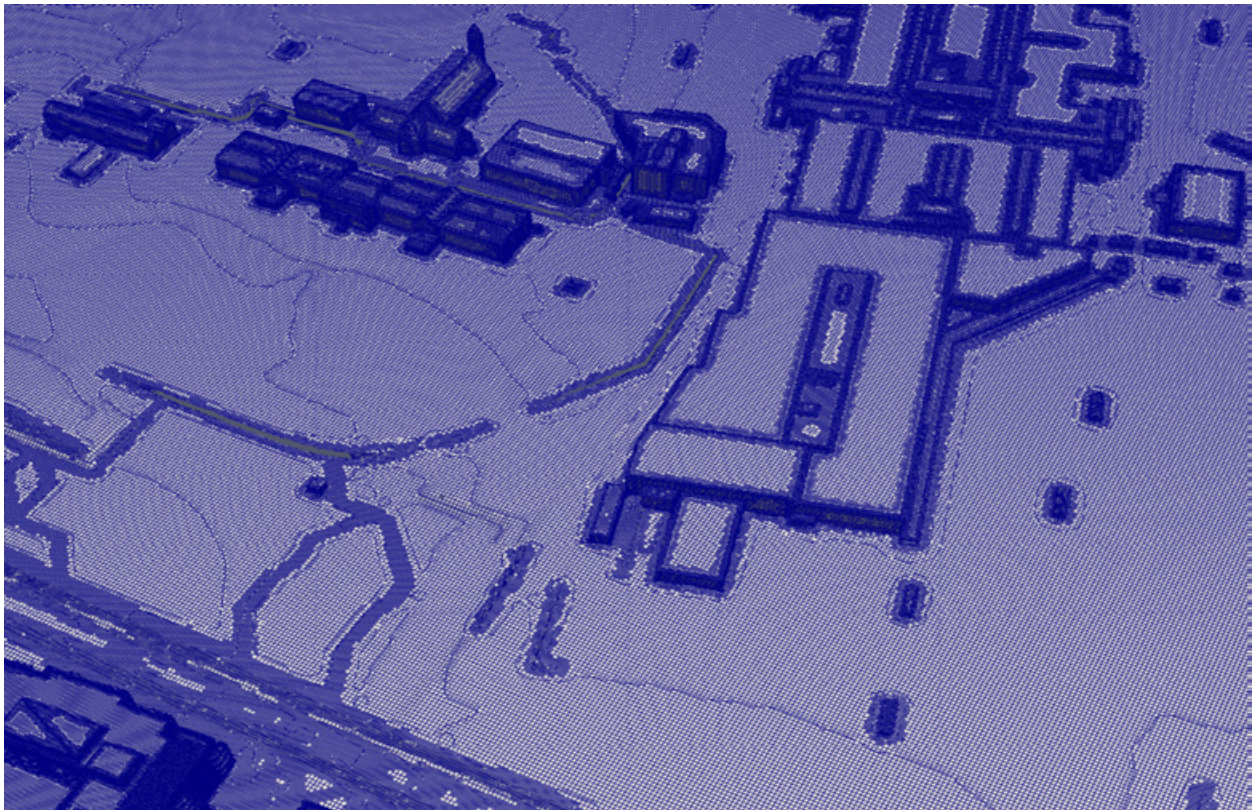


Fig. 36: Mesh Detail on Surrounds

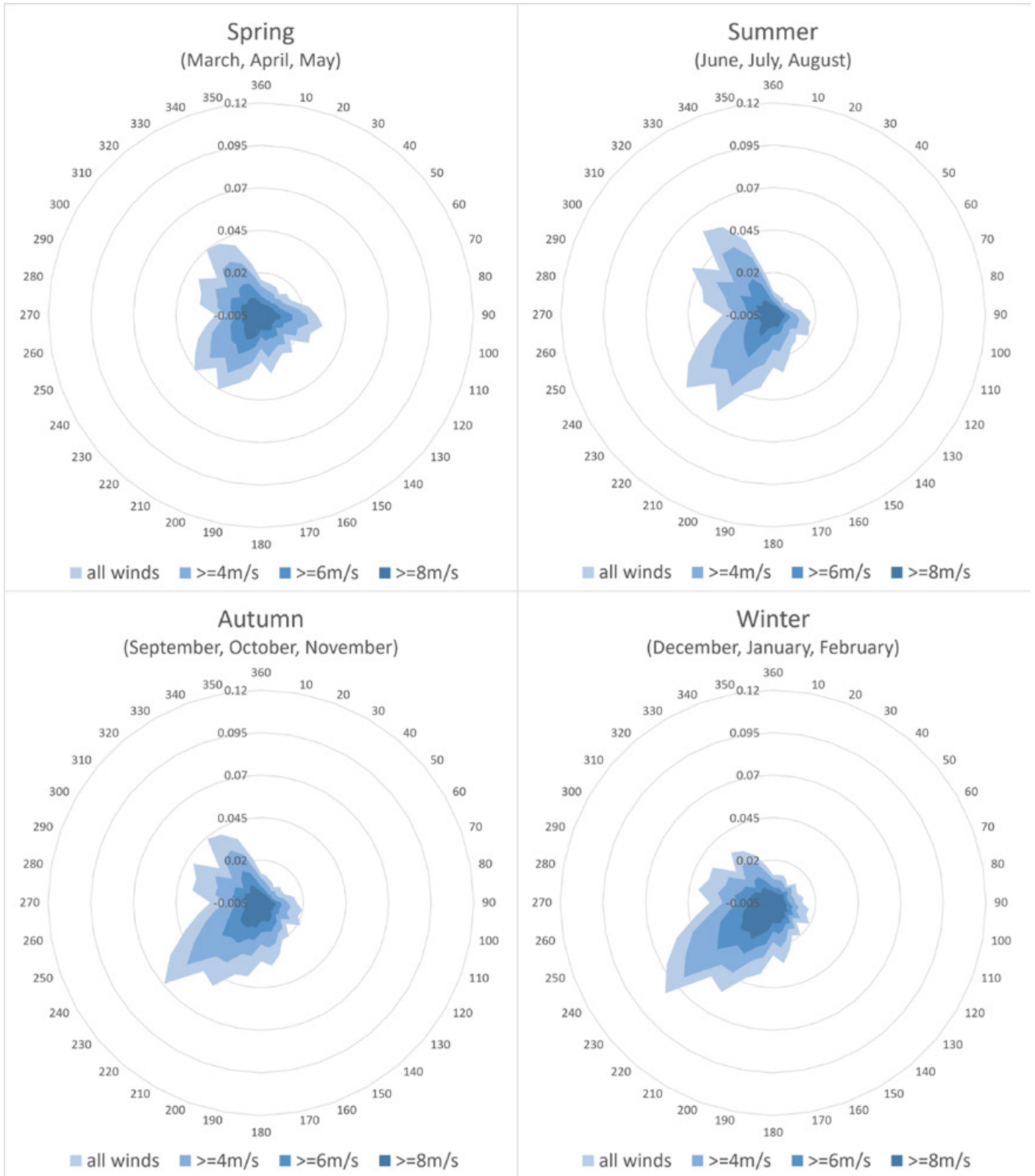


Fig. 37: Seasonal Wind Roses for Cork Airport (1990-2020)

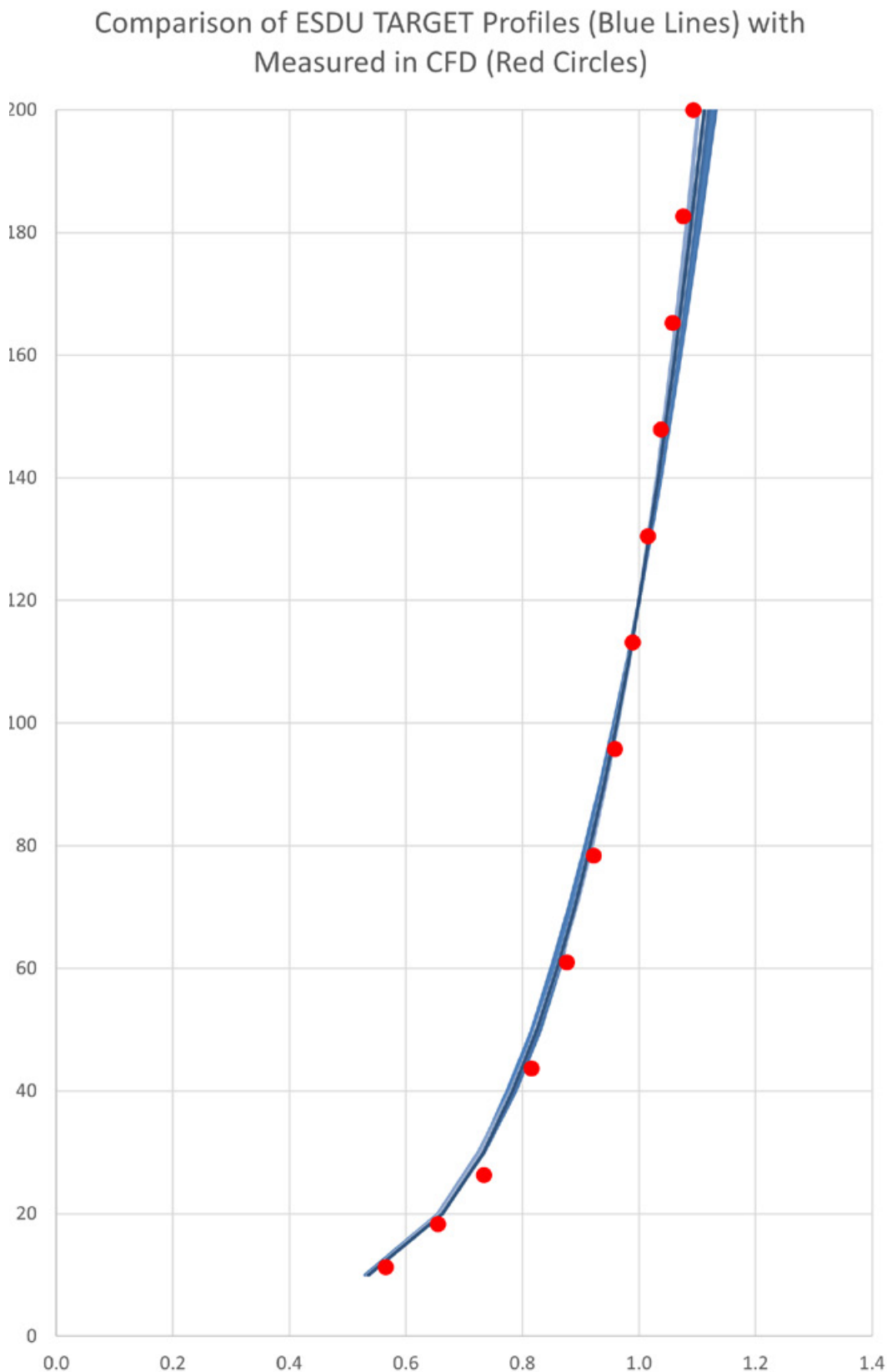


Fig. 38: Wind Profile for Central Cork



What we do:

Building Surveying
Daylight & Sunlight
Light Obstruction Notices
Measured Surveys
Party Wall & Neighbourly Matters
Rights of Light
Solar PV
Wind Analysis

Where we are:

Belfast
Birmingham
Bristol
Dublin
London
Manchester