

Chapter 11: Wind Microclimate

WIND MICROCLIMATE	
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SUPPORTING APPENDIX	ES Volume 3: Appendix Wind Microclimate: Annex 1: Wind Microclimate Assessment
KEY CONSIDERATIONS	<p>This chapter assesses the effects of the Proposed Development on the local wind microclimate, focusing on the suitability of wind speeds for the intended usage, in terms of pedestrian comfort and safety.</p> <p>Key wind microclimate consideration associated with the Proposed Development is the creation of undesirable wind speeds (resulting in effects to pedestrian comfort and safety) at ground level (specifically at building entrances, pedestrian thoroughfares, play areas and within amenity spaces with outdoor seating) and elevated level (specifically at balcony, podium and terrace level locations) within the site, and in areas surrounding the site (outside of the site boundary), including bus stops, thoroughfares and entrances once the Proposed Development is fully completed.</p> <p>The wind microclimate across the site was tested for the following configurations:</p> <ul style="list-style-type: none">Configuration 1: The Existing Site with Existing Surrounds (the Baseline Conditions);Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds;Configuration 3: Completed Proposed Development with Existing Surrounds; andConfiguration 4: Completed Proposed Development with Existing Surrounds and Proposed Landscaping
CONSULTATION	An EIA Scoping Report was prepared and submitted to the London Borough of Southwark (LBS) in January 2023. A copy of the EIA Scoping Report is provided in ES Volume 3, Appendix: EIA Methodology – Annex 1 . An EIA Scoping Opinion was issued by the LBS on 27th March 2024, which is provided in ES Volume 3, Appendix: EIA Methodology – Annex 2 , in which the methodology proposed for the wind microclimate assessment was generally accepted.

INITIAL DESIGN REVIEW

11.1 Prior to the wind tunnel assessment discussed within this ES chapter, Windtech conducted a desk-based review of the drawings, informed by Computational Fluid Dynamics (CFD) using ENGYS Helyx to provide the design team with initial insight into the expected wind conditions at the Proposed Development during the initial design phase. The outcomes of this assessment have been taken into consideration when designing the proposed landscaping scheme. The CFD testing was also used to help inform the positioning of probe locations in the wind tunnel tests, as these indicated where the higher wind speeds may be expected around the site. As such Probes P3, P25 and P33 were added in the surrounds to evaluate if the scale of the wind effect shown in the initial CFD testing remained or to ensure these positions showed no adverse wind conditions in the final design.

ASSESSMENT METHODOLOGY

Defining the Baseline

Current Baseline Conditions

11.2 The baseline conditions across the existing site and the surroundings have been defined using wind tunnel testing to provide a detailed, quantitative assessment. Mean and peak wind speeds have been determined for both the windiest season (normally winter) to show the worst-case scenario, and summer season for the calmest wind conditions. The wind conditions have been assessed for 36 wind directions in 10° increments within a 500m radius of the site (the results of which can be seen in Figure 11.1 Configuration 1: The Existing Site with Existing Surrounds) which is considered a large enough scale to ensure all wind effects are captured.

11.3 The wind climate of the London region has been obtained at meteorological stations located at Heathrow, Gatwick and Stansted airports. A combined total of 136 years of wind climate data has been collected from these stations, and the data from each station has been corrected so that it represents winds over standard open terrain at a height of 10m above ground. The Weibull parameters (statistical properties of wind climate)

have been used to generate the statistical model of the wind frequency (by speed and direction) for the London region, which has then been used in the detailed wind tunnel assessment.

Evolution of the Baseline

11.4 The evolved baseline is a baseline condition at an indeterminate point in the future, for a scenario which assumes all of the cumulative schemes are built in the surrounding environment and that the surrounding environment, including the site, has naturally evolved in the absence of the Proposed Development being implemented. Following a review of the cumulative schemes (as detailed in **ES Volume 1, Chapter 2: EIA Methodology**) there are no cumulative schemes identified within the 500m radius from the centre of the site. Therefore, given there are no cumulative schemes in close enough proximity that would necessitate a cumulative assessment or would significantly interact with the Proposed Development, no cumulative assessment has been undertaken.

Impact Assessment Methodology

Demolition and Construction

11.5 The potential wind microclimate impacts and likely effects during demolition and construction have not been directly assessed within the wind tunnel study, as this is a temporary condition and would be variable as the existing buildings are demolished (unless they are being retained) and the Proposed Development is constructed.

11.6 Typically for a wind microclimate assessment in London, the potential effects during demolition and construction would be assessed using the professional judgement of an experienced wind engineer, based on an assessment of the background wind climate at the site and an understanding of the effects of wind in the built environment. This approach is taken assuming that the activity on-site during this time (i.e., construction activity) is less sensitive to wind conditions than when the Proposed Development is completed and occupied (which would include entrance and amenity space, for example). In addition, there would be appropriate health and safety measures implemented to ensure that the construction workers were adequately protected, and public access would be restricted (i.e., 2.4m high hoarding around the site).

11.7 A qualitative assessment of the wind microclimate during demolition and construction has therefore been undertaken and is based on Windtech’s professional judgement (informed by an assessment of the background wind microclimate in the area, the results of the wind tunnel testing for the baseline and completed development scenarios, and Windtech’s experience of assessing wind in the build environment).

11.8 It is assumed that there will be restricted access (i.e., not accessible to the general public) to the site during demolition and construction, and therefore windier conditions will be tolerable as the area is not for typical pedestrian use where the tolerable wind speed threshold would be lower.

11.9 Regarding the use of cranes on site, it can be noted that these are typically slender and relatively “open” in structure. They would therefore not be expected to introduce any material microclimate effects to the site or surrounding area, that would require assessment in this ES.

Phasing

11.10 The demolition and construction of the Proposed Development is to be phased (as detailed in **ES Volume 1, Chapter 5: Demolition and Construction**). Therefore, an interim configuration (Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds) has been assessed, whereby Phase 1 of the Proposed Development is complete and built out, and the existing buildings (Aylesham Centre) in the eastern extent of the site remain. This represents a worst-case scenario with regard to wind conditions presented within the current results and previous CFD testing.

Completed Development

Prediction Methodology

- 11.11** Planning policy (including the NPPF¹, NPPG², London Plan³ and local policy including the Southwark Plan⁴) requires that the local wind microclimate within and around a new development should be assessed. To predict the local wind environment associated with the completed Proposed Development, and the resulting pedestrian comfort and safety within and immediately surrounding the site, wind tunnel testing of the Proposed Development has been undertaken.
- 11.12** Wind tunnel testing is one of the most well-established and robust means of assessing the pedestrian wind microclimate. Such testing allows the pedestrian level wind microclimate at and surrounding the site to be quantified and classified in accordance with the City of London (CoL) Lawsons Criteria, a summary of which are provided later in Table 11.1 of this ES chapter.
- 11.13** Wind tunnel testing delivers a detailed assessment of the mean and gust wind conditions around the site and the Proposed Development for the tested wind directions in terms of pedestrian comfort and safety and provides a basis to assess the potential wind microclimate impacts and likely effects of the Proposed Development with regards to its intended use.

Wind Tunnel Testing Methodology and Approach to Assessment

- 11.14** For the wind tunnel test a 1:400 scale model of the existing site and the surrounding area within a 500m radius of the centre of the site was constructed (following best practise and standard methodologies).
- 11.15** The wind tunnel methodology for quantifying the pedestrian level wind environment is outlined below within four steps. Full details of the assessment methodology can be obtained by reference to **ES Volume 3: Appendix: Wind Microclimate – Annex 1**.
- Step 1: The site's induced wind speeds are measured for the appropriate configuration(s) at the appropriate pedestrian level(s) in the wind tunnel;
 - Step 2: Standard meteorological data for the greater London region (for this assessment, meteorological data has been derived from London meteorological stations Heathrow, Gatwick and Stanstead combined) is adjusted to account for conditions at a subject site (this accounts for the upwind terrain roughness around the site);
 - Step 3: Data from Step 1 and Step 2 is combined to obtain the expected frequency and magnitude of wind speed for the appropriate configuration(s) and at the appropriate pedestrian level(s); and
 - Step 4: The results of Step 3 are compared with the Lawson Comfort Criteria (and where relevant, the change in the wind microclimate conditions between appropriate test configuration(s)) to 'grade / score' the conditions within and around a subject site. The criteria is widely adopted in the UK and Europe, including LBS.
- 11.16** To model the effects of gustiness or turbulence of the approaching winds to the particular site location, a series of grid, barrier and floor roughness elements have been employed in the wind tunnel to create a 'boundary layer' that is representative of the urban location of the site. In addition, the wind tunnel model included relevant buildings and other topographical features up to a 400m radius from the centre of the site.
- 11.17** Wind speed measurements within and around the site for the tested configurations were established using pressure-based wind speed sensors at key receptor areas. These are used to measure the mean and gust wind speeds at a full-scale height of approximately 1.5m above the surface upon which the sensor is located.

11.18 Wind speeds were measured at locations in and around the site under the existing conditions and for the Proposed Development for 36 wind directions in 10° increments, with 0° representing wind blowing from the north, 90° from the east, and so on.

11.19 The assessment of the wind microclimate is based on the results from a series of tests of physical models within the wind tunnel to provide a detailed and quantitative assessment. Four configurations have been tested within the wind tunnel, as set out below and shown in Figure 11.1 to 0:

- Configuration 1: The Existing Site with Existing Surrounds (the Baseline Conditions);
- Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds;
- Configuration 3: Completed Proposed Development with Existing Surrounds; and
- Configuration 4: Completed Proposed Development with Existing Surrounds and Proposed Landscaping.

Figure 11.1 Wind Tunnel Model – The Existing Site with Existing Surrounds (Configuration 1)



¹ Ministry of Housing, Communities and Local Government (MHCLG), 2023; 'National Planning Policy Framework

² <https://www.gov.uk/government/collections/planning-practice-guidance>

³ Greater London Authority (GLA), (2021); The London Plan: The Spatial Development Strategy for Greater London

⁴ London Borough of Southwark (2022); The Southwark Plan 2019-2036, Adopted February 2022

Figure 11.2 Wind Tunnel Model – Interim Phase of the Proposed Development with Existing Surrounds (Configuration 2)

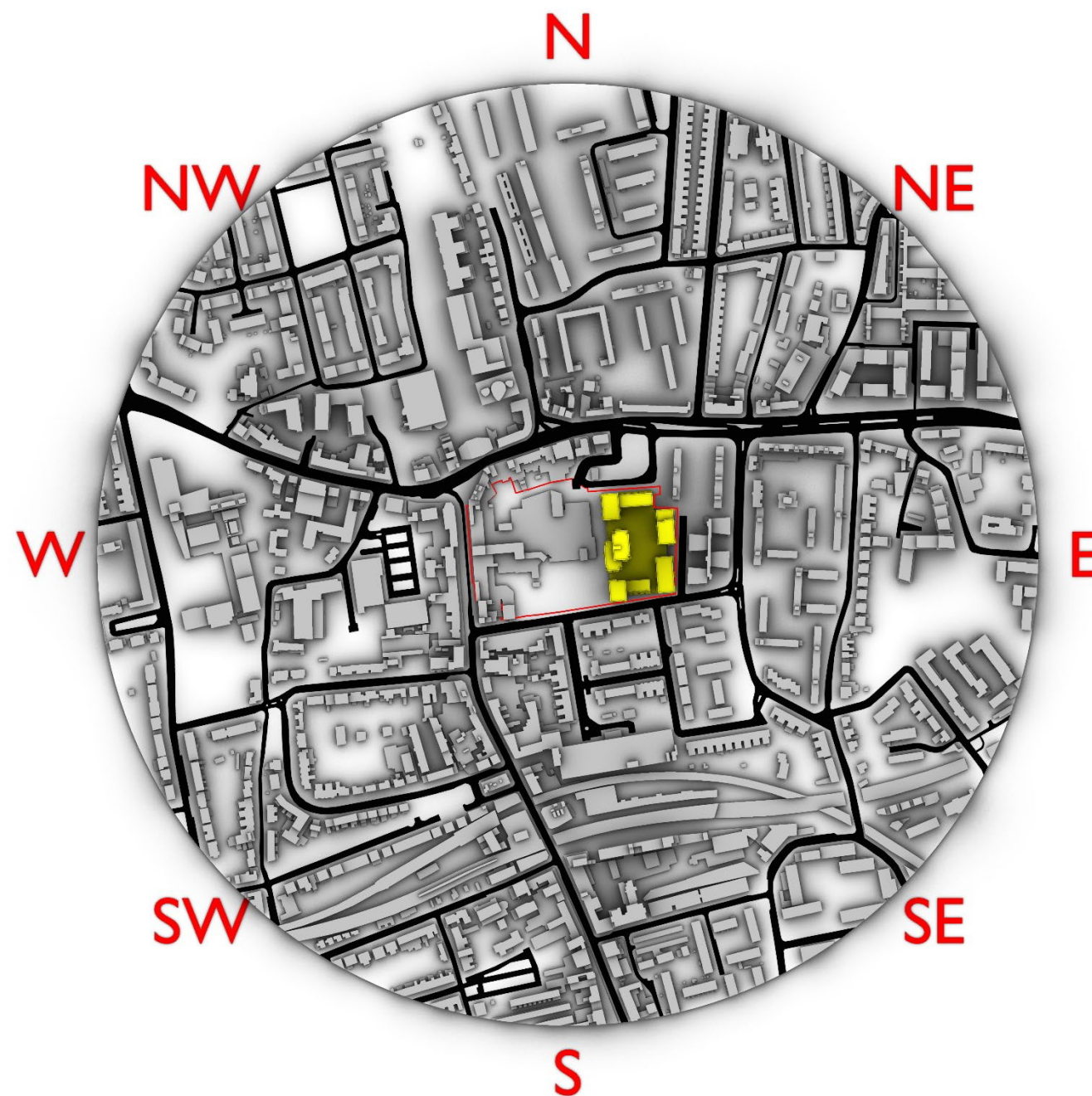


Figure 11.3 Wind Tunnel Model – Completed Proposed Development with Existing Surrounds (Configuration 3)



Figure 11.4 Wind Tunnel Model – Completed Proposed Development with Existing Surrounds and Proposed Landscaping (Configuration 4)



Regional Wind Model & Simulation of Atmospheric Winds

- 11.20** The characteristics of the regional winds have been determined from an analysis undertaken by Windtech Consultants of recorded directional wind speeds obtained from the meteorological stations located at Heathrow, Gatwick and Stansted airports. A combined total of 136 years of wind climate data has been collected from these stations, and the data from each station has been corrected so that it represents winds over standard open terrain at a height of 10m above ground. Data from each airport has been corrected to “open country” conditions at 10m height, to account for the effects of nearby terrain, using the methodology set out in ESDU 82026.
- 11.21** The meteorological data for the London area, shown below in Figure 11.5 and 0, was used in the wind tunnel study.

- 11.22** The meteorological data obtained for the London region indicates that the prevailing wind throughout the year is from the south-west (i.e., 202.5 to 247.5 degrees on the compass), which is typical for many areas of southern England. There is a secondary peak from the north-east during the late spring and early summer. The winds from the north-east are not as strong as the prevailing winds from the south-west.

Figure 11.5 Hourly Mean Wind Speeds (Referenced to 10m Height in Standard Open Terrain) and Frequencies of Occurrence for London (All-Year)

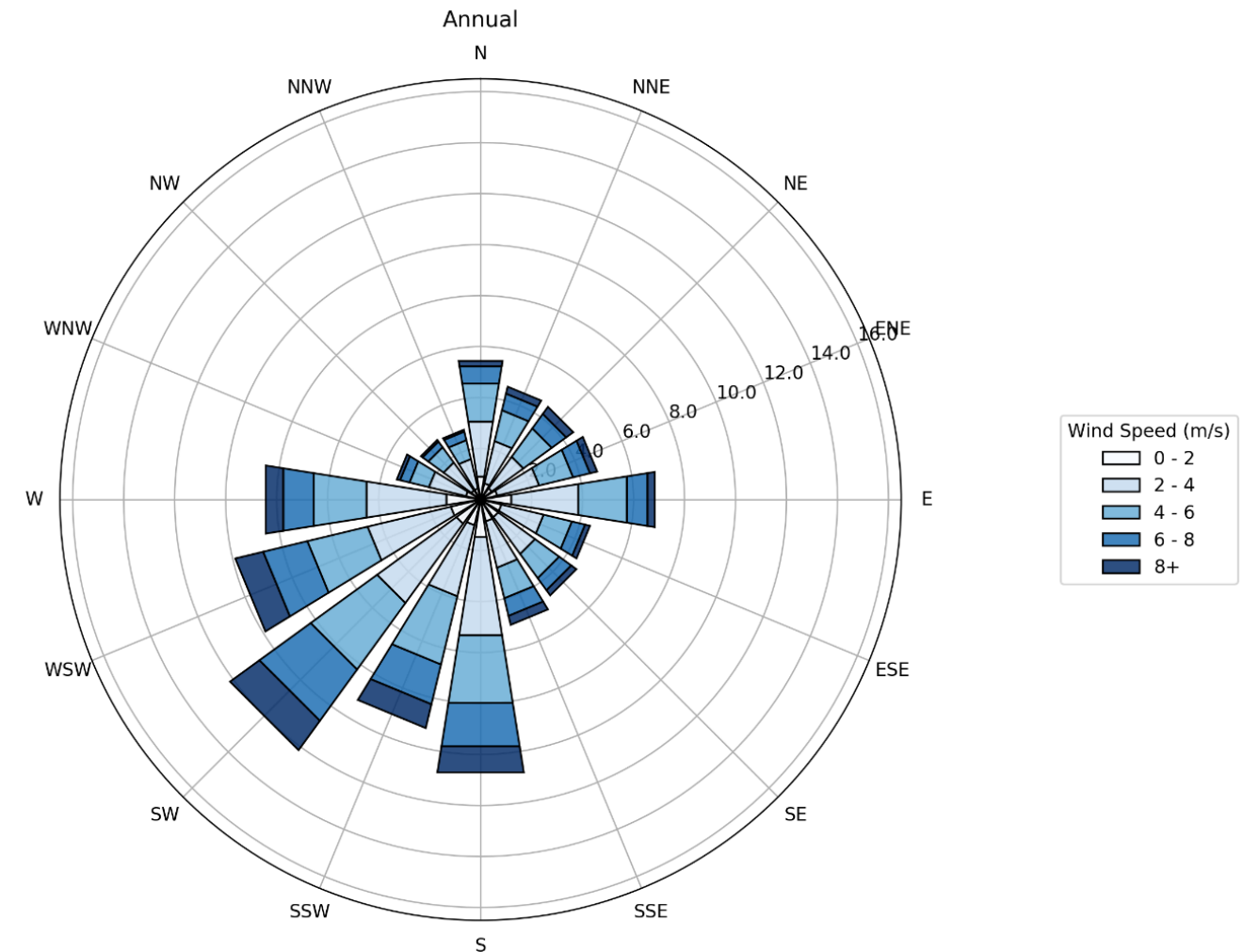
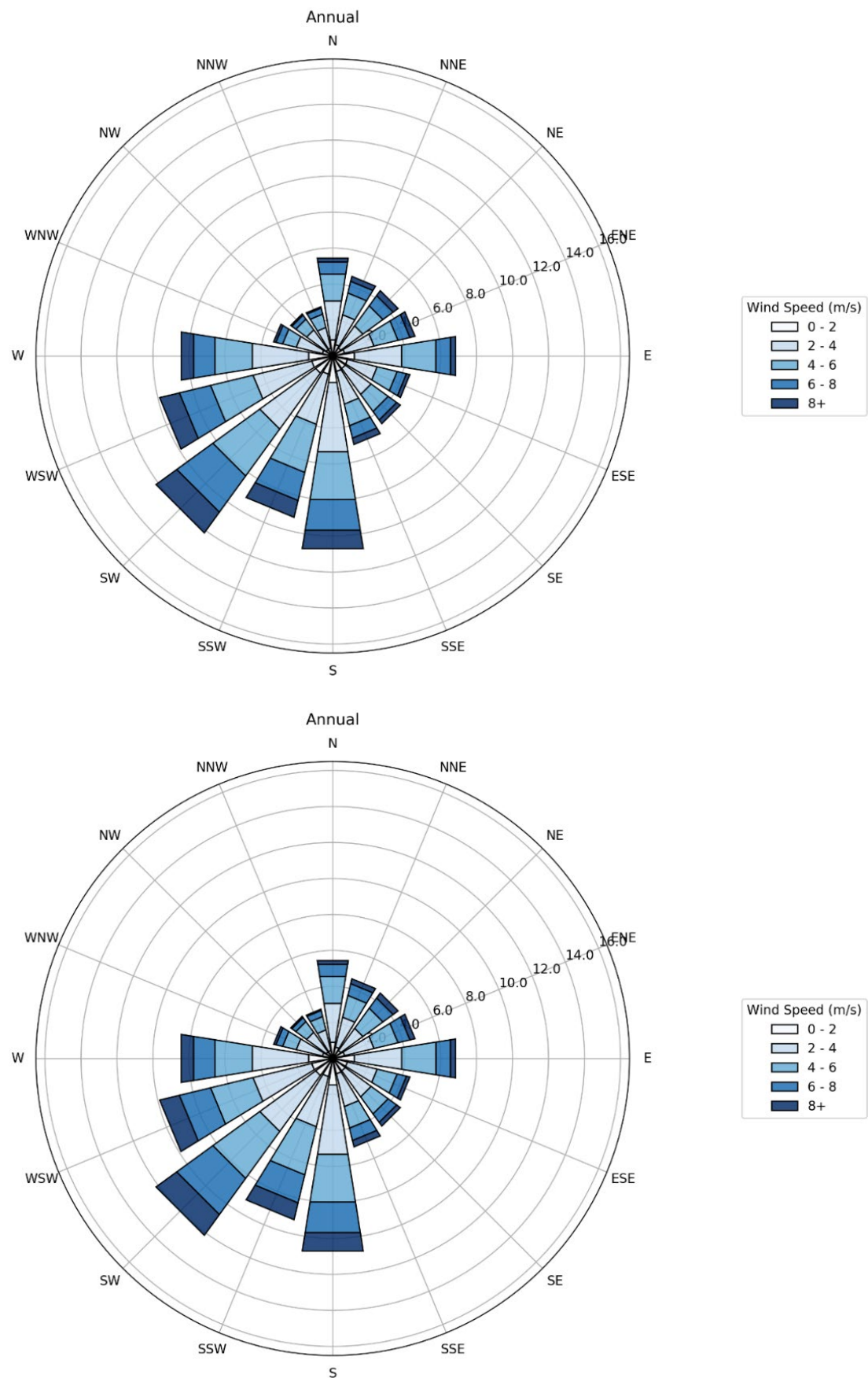


Figure 11.6 Hourly Mean Wind Speeds (Referenced to 10m Height in Standard Open Terrain) and Frequencies of Occurrence for London (Summer Top, Winter Bottom)



Assessment Criteria

Pedestrian Wind Comfort Criteria

- 11.23 The assessment of the wind conditions requires a standard against which the measurements can be compared. This assessment uses the CoL Lawsons Criteria in line with the CoL Wind Microclimate Guidelines and agreed methodology via the EIA Scoping process, which seeks to define the reaction of an average pedestrian to the wind, which is described in Table 11.1. If the measured wind conditions exceed the threshold wind speed for more than 5% of the time, then they are unacceptable for the stated pedestrian activity and the expectation is that there may be complaints of nuisance or people will not use the area for its intended purpose.
- 11.24 The City of London Lawsons Criteria (CoL) sets out four pedestrian activities and reflects the fact that less active pursuits require more benign wind conditions. The four categories are frequent sitting, occasional sitting, standing and walking, in ascending order of activity level, with a fifth category for conditions that are uncomfortable for all uses. In other words, the wind conditions in an area for sitting need to be calmer than a location that people merely walk past.
- 11.25 The City of London Lawsons Criteria (CoL) are derived for open air conditions and assume that pedestrians would be suitably dressed for the season. Thermal comfort is discussed with reference to acceptable wind environments but not evaluated as part of the assessment.
- 11.26 The Lawson Criteria for Criteria used is outlined in the Table 11.1 below.

Table 11.1 City of London Lawsons Criteria for Comfort

Key	Comfort Category	Threshold Wind Speed	Description
●	Uncomfortable	>10m/s	No comfortable for regular pedestrian access.
●	Walking	8.0m/s	Acceptance for external pavements, walkways.
●	Standing	6.0m/s	Acceptable for entrances, bus stops, covered walkways or passageways beneath buildings.
●	Occasional Sitting	4.0m/s	Acceptable for occasional outdoor seating, e.g., general public outdoor spaces, balconies and terraces intended for occasional use, etc.
●	Frequent Sitting	2.5m/s	Acceptable for frequent outdoor sitting use, e.g., restaurant, café.

Target Wind Conditions

- 11.27 Wind conditions suitable for strolling or calmer are desirable on main thoroughfares during the windiest season for a mixed-use development in an urban area such as the Proposed Development. Standing use wind conditions or calmer are generally required at entrances throughout the year. Wind conditions suitable for sitting in the summer season (when these areas are more likely to be frequently used by pedestrians) are desirable for general public amenity spaces.

Strong Winds

- 11.28 The Lawson Criteria also specifies a strong wind threshold when winds exceed 15 m/s for more than 0.022% of the year. Exceedance of this threshold will require remedial measures or a careful assessment of the expected use of that location, e.g., is it reasonable to expect pedestrians to be present at the location on the windiest day of the year.
- 11.29 Strong winds are generally associated with areas which would be classified as uncomfortable for all uses. In a residential-led, 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.

Assumptions and Limitations

- 11.30
- The wind tunnel assessment is based on worst-case wind speeds, expected to be encountered during the winter season (December, January and February) in the UK. This complies with the standard methodology set out by Lawson for the wind-microclimate assessments.
- 11.31
- The proposed massing was taken directly from 3D models provided by the architects. The Proposed Development has since undergone some minor design alterations following technical assessment as follows:
- Relocated balconies on Building N and Q;
 - Building N: solid balustrade proposed to the inset balconies on first floor;
 - Addition of balcony dividers to the terraces of several buildings: E, H, J, N;
 - Wind mitigation screens to be added to a small number of balconies on Building L;
 - Building M internal layout reconfigured at Level 19;
 - Parapet of Building L top roof and Building K lower roof lowered by 1m;
 - Parapet of Building K on the north-eastern edge lowered by 1m; and
 - Staircase of building L extended to roof level.
- 11.32
- A qualitative review has been undertaken of the updated model provided. It is considered that the changes to the scheme are slight and will not result in a material change to results for impacts to neighbours.

Results Presentation Method

- 11.33
- The wind conditions are presented by the following legends in Table 11.2. This is used in conjunction with the target criteria presented in Table 11.1 to assess the impact on each location.

Table 11.2 Wind Tunnel Results Legend

Key	Legend	Description
	Unsafe	Above Pedestrian Safety Limit
	Safe	Within Pedestrian Safety Limit
	Uncomfortable	No comfortable for regular pedestrian access.
	Walking	Acceptance for external pavements, walkways.
	Standing	Acceptable for entrances, bus stops, covered walkways, or passageways beneath buildings.
	Occasional Sitting	Acceptable for occasional outdoor seating, e.g., general public outdoor spaces, balconies and terraces intended for occasional use, etc.
	Frequent Sitting	Acceptable for frequent outdoor sitting use, e.g., restaurant, café.

Methodology for Defining Effects

Receptors and Receptor Sensitivity

- 11.34
- The sensitivity of receptors is related to the intended pedestrian use at each location; there are no definitions for sensitivity, as the important consideration is whether the wind conditions experienced at a particular receptor location are suitable for the intended use (in terms of pedestrian comfort and strong winds) at that particular location. All receptors are considered to be highly sensitive to the local wind microclimate conditions and are given an equal weighting.
- 11.35
- A total of 148 study point locations were used for measuring the wind speed within and around the site, across the configurations. To allow a direct comparison between wind conditions across the site under the different scenarios, measurement locations were kept consistent across all testing configurations. The study point locations and their target criteria are presented in 0 to Figure 11.11.
- 11.36
- The wind conditions are compared with the intended pedestrian use, as below:
- Thoroughfares – targeting walking wind conditions during the windiest season;
 - Entrances – targeting standing wind conditions during the windiest season;
 - Seating Areas and Play Areas – targeting frequent to occasional sitting wind conditions during the summer season;
 - Roads – targeting walking wind conditions during the windiest season;
 - Pedestrian Crossings – targeting standing conditions during the windiest season;
 - Bus Stops – targeting standing conditions during the windiest season;
 - Podiums and Terraces – targeting occasional sitting conditions during the summer season; and
 - Private Balconies – targeting occasional sitting conditions during the summer season.
- 11.37
- In addition, the wind conditions in the surrounding area are also considered within the area that would potentially be influenced by the Proposed Development. For sensitive receptors surrounding the site, consideration is given to the uses listed above, where appropriate.
- 11.38
- The scale and significance of an effect is defined based on whether the wind conditions are worse compared to the wind conditions in the baseline, and considering the suitability of the location for the intended use. The detailed explanation of the effect scale is listed in Table 11.3.

Figure 11.7 Study Point Locations and Target Wind Speed Criteria – Completed Proposed Development with Existing Surrounds – Ground Level

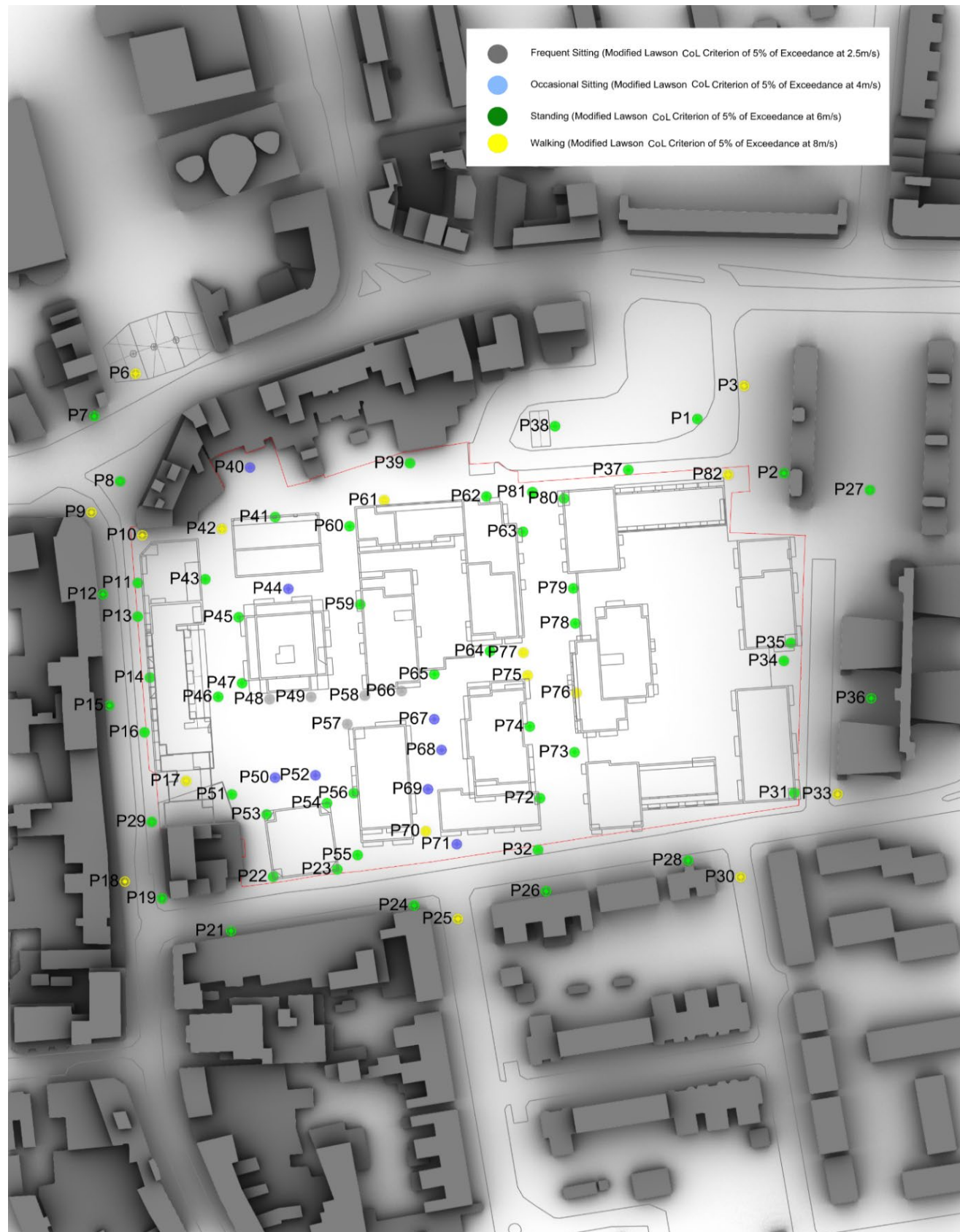


Figure 11.8 Study Point Locations and Target Wind Speed – Completed Proposed Development with Existing Surrounds – Elevated Podium Amenity

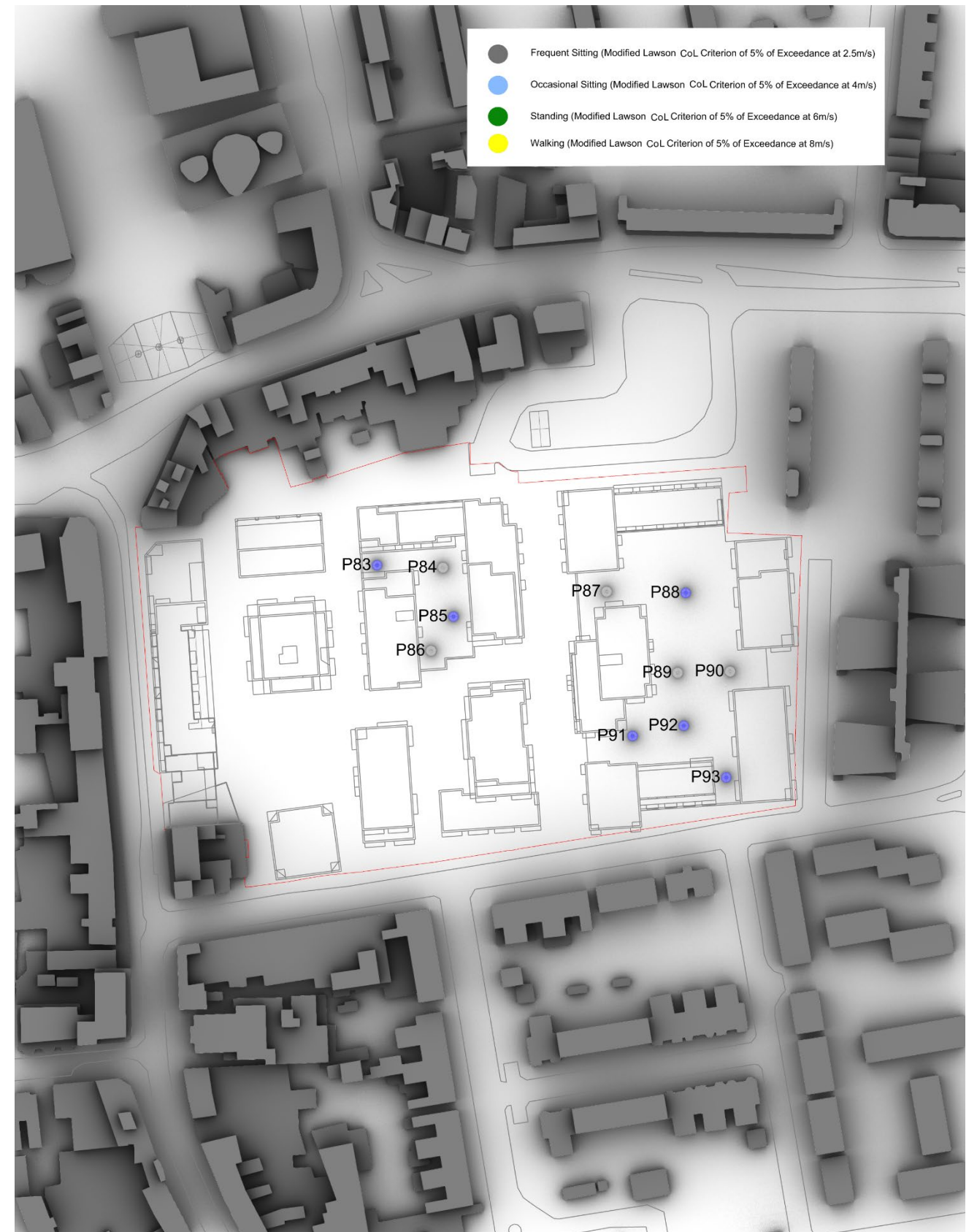


Figure 11.9 Study Point Locations and Target Wind Speed Criteria – Completed Proposed Development with Existing Surrounds – Elevated Balcony Lower Levels

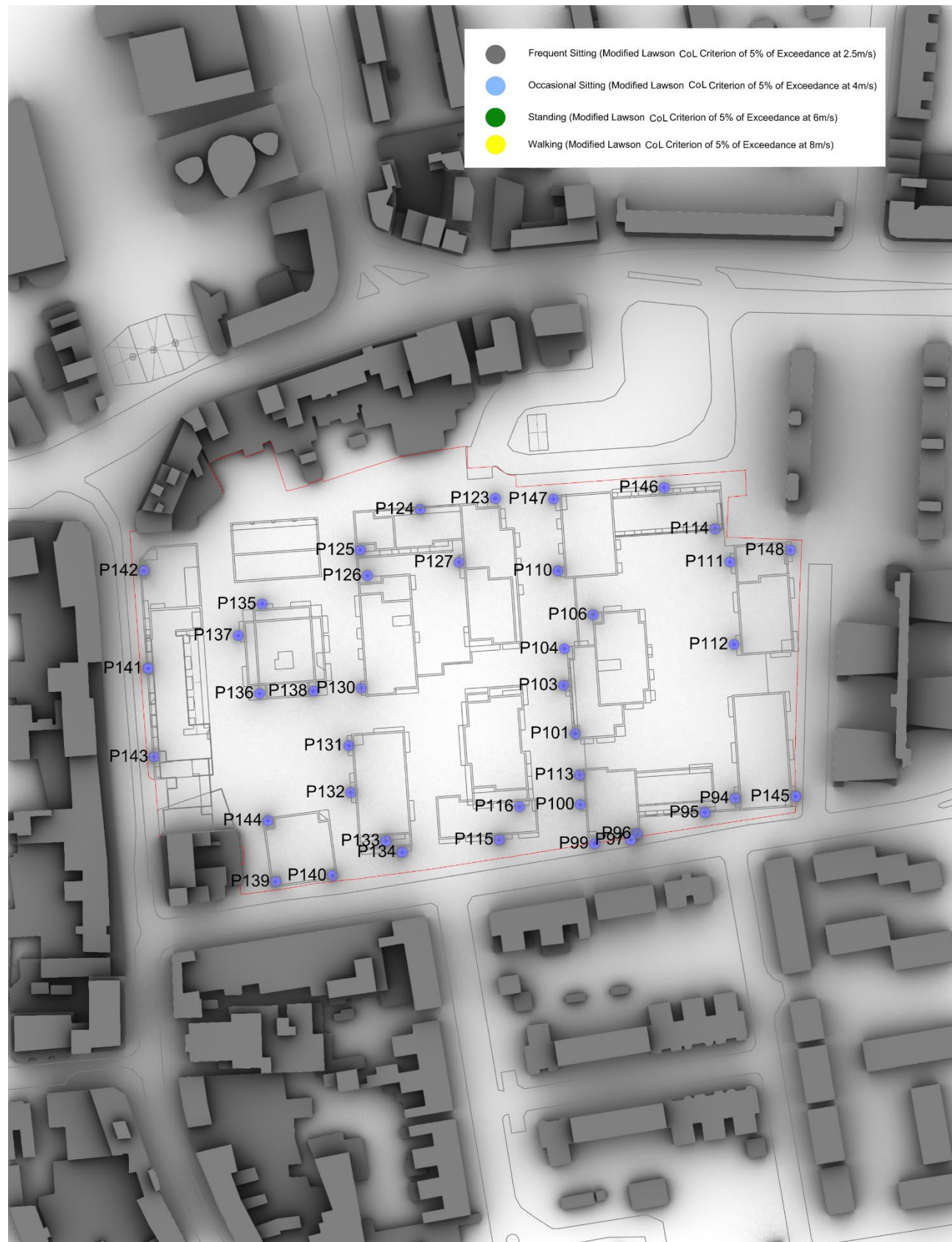


Figure 11.10 Study Point Locations and Target Wind Speed Criteria – Completed Proposed Development with Existing Surrounds – Elevated Balcony Upper Levels

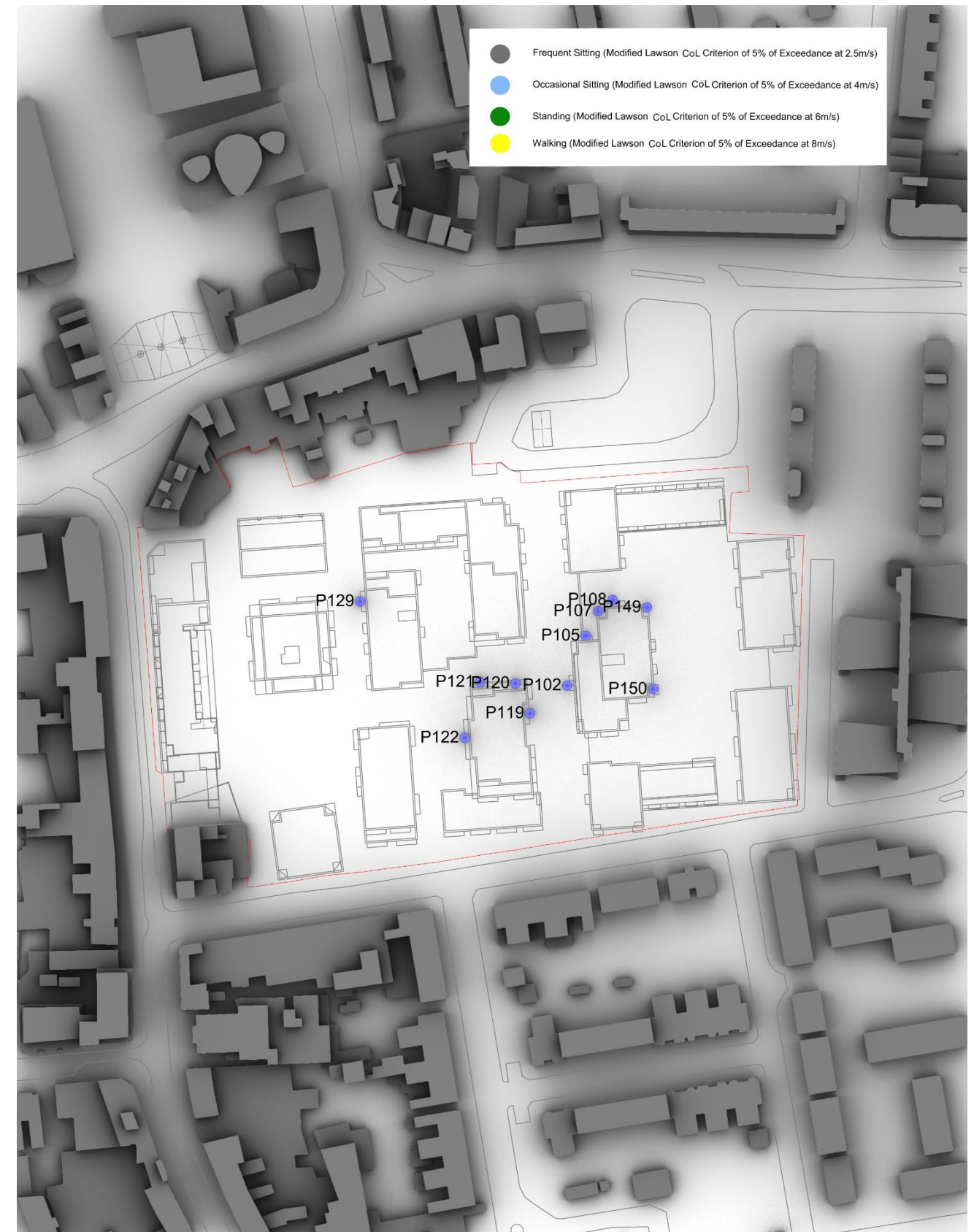


Figure 11.11 Study Point Locations and Target Wind Speed Criteria – Completed Proposed Development with Existing Surrounds – Elevated Terraces Upper Levels



Magnitude of Impact

11.39 The magnitude of impact for all receptors is consistent (in respect of the specific wind direction and speed defined by meteorological data) and the resulting effect at each location is in accordance with the intended end use / target conditions. The impact at all receptors is the same (i.e., high), as any receptor which has wind conditions windier than required for the intended use will require mitigation, regardless of location.

Defining the Effect

- 11.40 In terms of the nature of the effect, effects can either be beneficial (calmer conditions than required), adverse (windier conditions than required), or neither (conditions are those required) and be negligible. For on-site locations, an adverse effect implies that a location has a wind environment that is unsuitable for its intended use and mitigation would therefore be required.
- 11.41 The criteria used in the assessment of both potential and residual effects are based upon the relationship between the desired pedestrian use of an area of the Proposed Development (based on the categories defined by the City of London Lawson Comfort Criteria) and the predicted wind conditions at that location. This also allows for the assessment to account for any change in pedestrian activity that might arise because of the Proposed Development.
- 11.42 The scale of on-site measurement locations is defined by comparing the wind comfort/safety levels with the intended pedestrian activity at each location, shown in Table 11.3 below.

Table 11.3 Effect Scale and Nature Criteria for Measurement Locations (On-Site)

Scale and Nature of Effect	Trigger	Mitigation Required?
Major Adverse	Conditions are 'unsafe'	Yes
Moderate Adverse	Conditions are 'unsuitable' (in terms of comfort) for the intended pedestrian use.	Yes
Negligible	Conditions are 'suitable' for the intended pedestrian use.	No
Moderate Beneficial	Conditions are calmer than required for the intended pedestrian use (by at least one category)	No

11.43 The significance of off-site measurement locations is defined not only by comparing the wind comfort levels with the intended pedestrian activity but also by comparing the conditions to those experienced prior to the introduction of the Proposed Development (the baseline scenario), using the criteria set out in Table: 11.4.

Table 11.4 Effect Scale and Nature Criteria for Measurement Locations (Off-Site)

Scale and Nature of Effect	Trigger	Mitigation Required?
Major Adverse	Conditions that were 'safe' in the baseline scenario become 'unsafe' as a result of the Proposed Development. OR Conditions that were 'suitable' in terms of comfort in the baseline scenario become 'unsuitable' as a result of the Proposed Development. OR Conditions that were 'unsafe' in the baseline scenario are made worse as a result of the Proposed Development.	Yes
Moderate Adverse	Conditions that were 'suitable' in terms of comfort in the baseline scenario are made windier (by at least one comfort category) as a result of the Proposed Development, but remain 'suitable' for the intended pedestrian activity.	No
Negligible	Conditions remain the same as in the baseline scenario.	No
Major Beneficial	Conditions that were 'unsafe' in the baseline scenario become 'safe' as a result of the Proposed Development.	No
Moderate Beneficial	Conditions that were 'unsuitable' in terms of comfort in the baseline scenario become 'suitable' as a result of the Proposed Development. OR Conditions that were 'unsafe' in terms of comfort in the baseline scenario become 'suitable' as a result of the Proposed Development.	No

- 11.44 Effects during the demolition and construction works are direct, local and short-term (temporary).
- 11.45 Effects once the Proposed Development is completed are direct, local and long-term (permanent).
- 11.46 The geographical extent of the wind microclimate is expected to be within the site and its immediate surroundings, i.e., a local impact, for all receptors.
- 11.47 Strong winds (affecting pedestrian and cyclist safety) are assigned a scale of effect, with any strong wind exceedance being identified as a Major Adverse (significant) effect and unsafe. Where strong winds occur, mitigation is required (as per the wind comfort required for intended pedestrian activities at on and off-site locations).

Categorising Likely Significant Effects

- 11.48 For on-site wind conditions, conditions which are windier than required would represent a significant effect and would require mitigation measures. This would be all adverse effects (of any scale). For off-site wind conditions, an effect is significant if it would be both windier than the baseline as well as being windier than required for the intended use (i.e. Major Adverse). A Moderate Adverse effect occurring off-site is not significant for the purpose of this assessment, in line with the Wind Microclimate Guidelines for Development in the CoL.
- 11.49 Wind conditions which are suitable or better than required are negligible or beneficial of any scale and would not represent a significant effect.
- 11.50 In addition, any identified strong winds are classed as 'significant'.

BASELINE CONDITIONS

- 11.51 Wind conditions for Configuration 1: Existing Site with Existing Surrounds are presented in Figure 11.12 to Figure 11.14.

Pedestrian Comfort

Thoroughfares

- 11.52 The thoroughfares of the existing site and surrounds are suitable for standing and walking during the worst season (winter) and are therefore suitable for their intended use.

Entrances

- 11.53 The entrances of the existing site and surrounds are suitable for occasional sitting to standing during the worst season (winter) and are therefore suitable for their intended use.

Seating Areas / Play Areas

- 11.54 The seating / play areas of the existing site and surrounds are suitable for seating and standing during the summer season. P27 experiences standing during the summer season and is therefore unsuitable for the intended use, being one category windier than the desired condition.

Roads

- 11.55 The roads of the existing site and surrounds P25 and P30 are suitable for standing during the worst season (winter) and are therefore suitable for their intended use.

Pedestrian Crossings

- 11.56 The pedestrian crossings of the existing site and surrounds are suitable for standing during the worst season (winter) and are therefore suitable for their intended use.

Bus Stops

- 11.57 The bus stops of the existing site and surrounds are suitable for standing during the worst season (winter) and are therefore suitable for their intended use.

Pedestrian Safety

Strong Winds

- 11.58 The results for the existing surrounds indicate that the wind conditions at ground level do not exceed the safety criterion within the site and surrounds. The wind conditions are rated as safe for pedestrians and cyclist use throughout the year.

Figure 11.12 Wind Tunnel Results – Configuration 1: The Existing Site with Existing Surrounds, Comfort Results, Winter Season. Ground

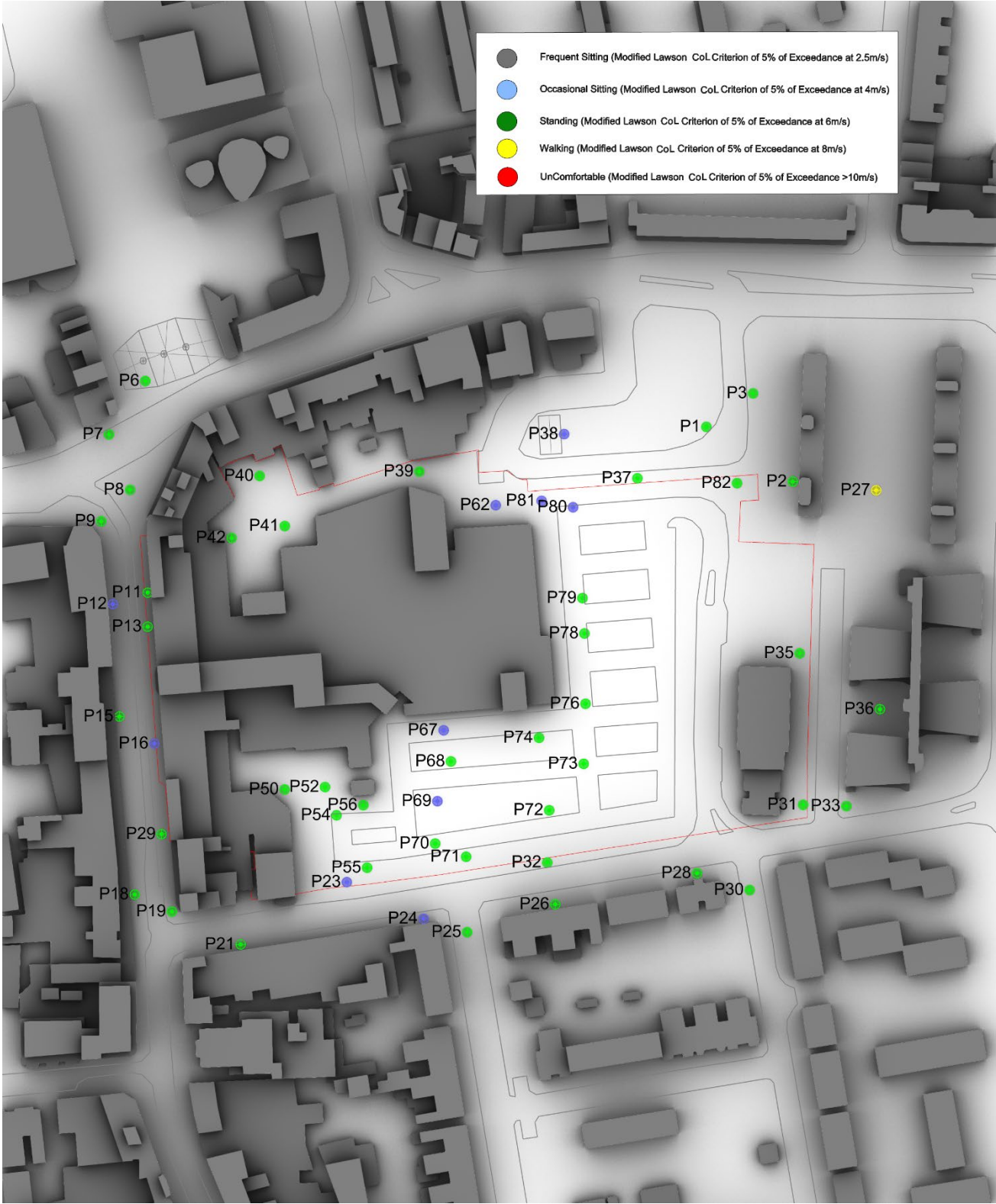


Figure 11.13 Wind Tunnel Results – Configuration 1: The Existing Site with Existing Surrounds, Comfort Results, Summer Season. Ground

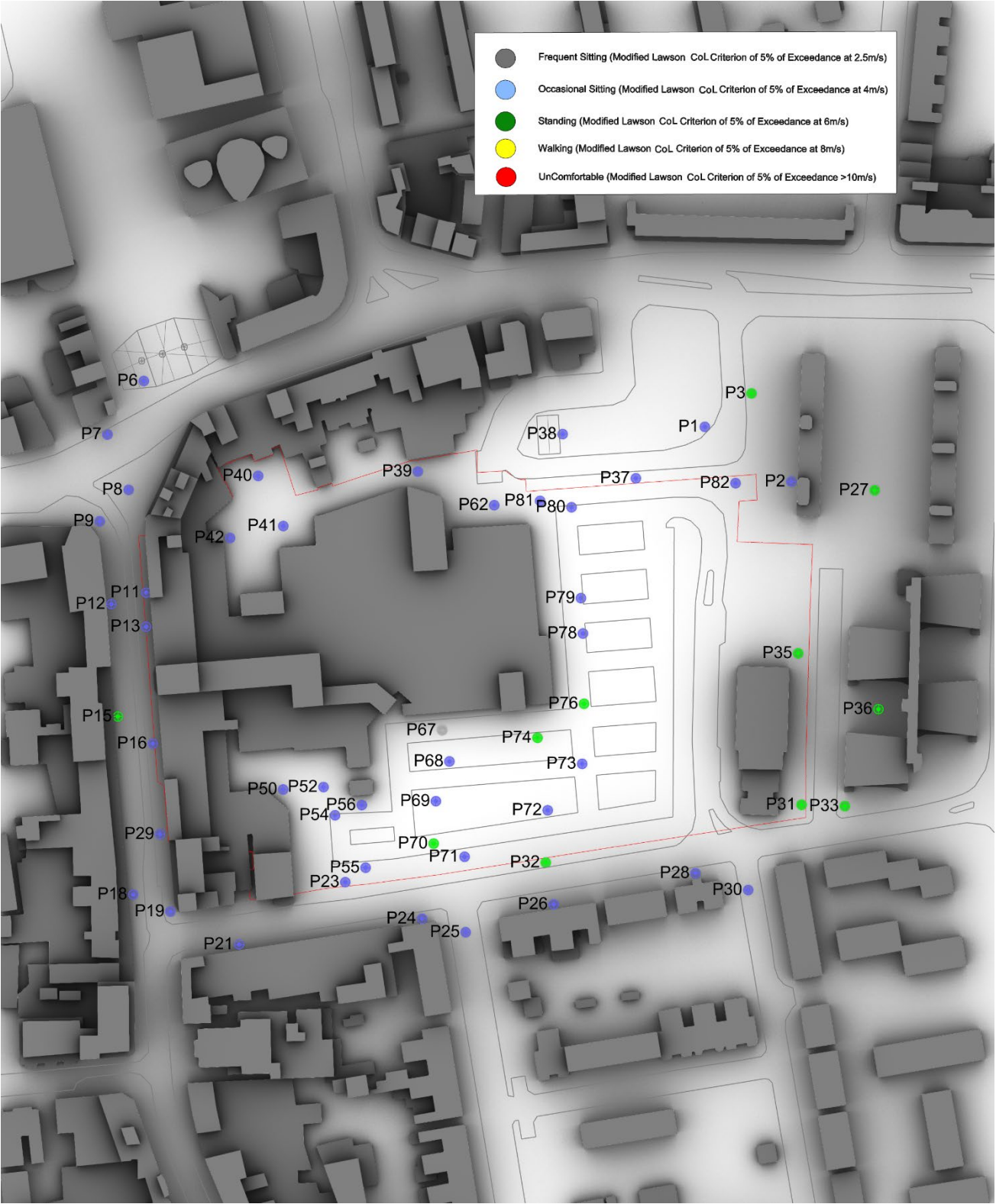


Figure 11.14 Wind Tunnel Results – Configuration 1: The Existing Site with Existing Surrounds, Safety Results, Annual, Ground



RECEPTORS AND RECEPTOR SENSITIVITY

11.59 In assessing wind microclimate there are no definitions for the sensitivity of receptors, with each receptor being highly sensitive to changes to the local wind microclimate conditions. Receptors likely to be affected by development of the site include all pedestrians using or visiting the Proposed Development and the surrounding areas, as well as pedestrians and cyclists on surrounding thoroughfares and entrances to the surrounding buildings.

Existing

11.60 Table 11.5 lists all of the measurement locations across the existing site and surrounding area which have been assessed.

Table 11.5 Receptors of the Existing Scenario (Configuration 1)

Receptor	Receptor Reference
Thoroughfares	P3, P6, P9, P18, P23, P31, P33, P35, P36, P39, P40, P41, P42, P50, P52, P54, P55, P56, P62, P67, P68, P69, P70, P71, P72, P73, P74, P76, P78, P79, P80, P81 and P82
Entrances	P2, P11, P12, P13, P16, P19, P24, P26, P28, P29 and P38
Seating Areas / Play Areas	P27
Roads	P25 and P30
Pedestrian Crossings	P7 and P8
Bus Stops	P1, P15, P21, P32 and P37

Introduced

11.61 The new sensitive receptors resulting from the introduction of the Proposed Development includes the users of the Proposed Development; namely users of the amenity areas/ public realm (including play space) (at ground, podium, balcony and terrace level); building entrances; and pedestrian thoroughfares, in addition to the existing off-site sensitive receptors identified above. Table 11.6 sets out the probe locations and the corresponding receptors on and off-site with the inclusion of the Proposed Development.

Table 11.6 Receptors of the Proposed Development (Configurations 2 to 4)

Receptor	Receptor Reference
Thoroughfares	P3, P6, P9, P10, P17, P18, P33, P42, P61, P70, P75, P76, P77 and P82
Entrances	P2, P11, P12, P13, P14, P16, P19, P22, P23, P24, P26, P28, P29, P31, P35, P38, P41, P43, P45, P47, P51, P53, P54, P56, P59, P63, P64, P65, P72, P79, P80
Seating Areas / Outdoor Amenity Space/ Play Area	P27, P34, P36, P44, P46, P48, P49, P50, P52, P55, P57, P58, P60, P62, P66, P67, P68, P69, P71, P73, P74, P78 and P81
Roads	P25 and P30
Pedestrian Crossings	P7 and P8
Bus Stops	P1, P15, P21, P32 and P37
Podium and Terraces	P4, P5, P20, P83, P84, P85, P86, P87, P88, P89, P90, P91, P92, P93, P98, P117, P118 and P128
Private Balconies	P94, P95, P96, P97, P99, P100, P101, P102, P103, P104, P105, P106, P107, P108, P110, P111, P112, P113, P114, P115, P116, P119, P120, P121, P122, P123, P124, P125, P126, P127, P129, P130, P131, P132, P133, P134, P135, P136, P137, P138, P139, P140, P141, P142, P143, P144, P145, P146, P147, P148, P149, P150

POTENTIAL EFFECTS

Demolition and Construction

- 11.62** Wind conditions during the demolition and construction works would be expected to gradually adjust from those of Configuration 1: Existing Site with Existing Surrounds, to the likely wind conditions identified for the Configuration 3: Completed Proposed Development with Existing Surrounds .
- 11.63** Whilst there is the potential for an increase in the local windiness across the site as a result of the demolition of the existing building, the works are unlikely to create conditions unsuitable for a working construction site or pedestrian thoroughfares surrounding the cleared area (with health and safety measures implemented and public access would not be provided (i.e., 2.4m hoarding in place).
- 11.64** Similarly, the wind environment during the construction of the Proposed Development is assumed to be variable. As construction proceeds, the wind conditions in and around the site are expected to gradually adjust towards the likely effects of the Proposed Development.
- 11.65** No additional wind mitigation measures would be required specifically for the demolition and construction phase, and therefore wind conditions during the demolition and construction works of the Proposed Development would represent a Negligible (not significant) effect.
- 11.66** In a scenario where one of the buildings of the Proposed Development is completed and operational and work is still undergoing on the others, any mitigation measures relative to this building's operational areas would need to be in place prior to the completion of the superstructure of this phase of the Proposed Development.

Phasing

Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds

- 11.67** Wind conditions for Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds are presented in Figure 11.15 to Figure 11.25.

Pedestrian Comfort

Thoroughfares

- 11.68** In the presence of the interim phase of the Proposed Development, at ground level, the wind conditions at thoroughfares range from occasional sitting to walking during the worst season (winter). Hence, the wind conditions at all the thoroughfares at the site and within the surrounds are suitable for pedestrian and cyclist use throughout the year. This represents from Negligible (not significant) to Moderate Beneficial (not significant) effects.

Entrances

- 11.69** The wind microclimate at all the entrances of Phase 1 of the Proposed Development experience occasional sitting to standing conditions, and therefore are suitable for ingress/egress throughout the year. This represents from Negligible (not significant) to Moderate Beneficial (not significant) effects.
- 11.70** In the surrounds, the wind conditions at the entrance of the neighbouring building (Point 28) exceed the comfort criterion for ingress/egress use during the worst season (winter) by one category (walking conditions). Point 28 represents the entrance to a neighbouring building that does present worse than existing conditions, but the entrance is raised and surrounded by existing trees and landscaping. Therefore, this will provide additional shelter and is not expected to be of concern in terms of wind comfort. This represents a Negligible (not significant) effect.

Seating Areas / Play Areas

- 11.71** The seating / play areas of the interim phase of the Proposed Development and existing surrounds at P27 are suitable for occasional sitting during the summer season. This represents a Moderate Beneficial (not significant) effect.

Roads

- 11.72** The roads (Point 25 and Point 30) of the interim phase of the Proposed Development and existing surrounds experience standing and occasional sitting wind conditions, respectively, and therefore are suitable for standing during the worst season (winter). This represents a Negligible (not significant) effect.

Pedestrian Crossings

- 11.73** The pedestrian crossings of the interim phase of the Proposed Development and existing surrounds are suitable for standing during the worst season (winter). Both P7 and P8 achieve occasional sitting, therefore resulting in a Negligible (not significant) effect.

Bus Stops

- 11.74** The bus stops of the interim phase of the Proposed Development and existing surrounds are suitable for standing and walking during the worst season (winter). This represents a Negligible (not significant) at Points 1, 15, 21 and 37, and a Major Adverse (significant) effect at P32. As this location includes surrounding existing trees, walls and bus shelter it is expected with the inclusion of the additional shelter provided by these elements that this effect will not be a residual concern.

Podium and Terraces

- 11.75** The podium and terraces of Phase 1 of the Proposed Development at Points 20, 87, 88, 89, 90, 91, 92, 93, 98 and 117 exceed the comfort criterion for occasional sitting during the summer season. This represents Moderate Adverse (significant) effects and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.

Private Balconies

- 11.76** The private balcony of Phase 1 of the Proposed Development at Point 145 experiences wind conditions suitable for occasional sitting during the summer season, representing a Negligible (not significant) effect.
- 11.77** The private balconies of Phase 1 of the Proposed Development at Points 94, 95, 96, 97, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 110, 111, 112, 114, 146, 147, 148, 149 and 150 exceed the comfort criterion for occasional sitting during the summer season. This is one category windier in the majority of locations and represents a Moderate Adverse (significant) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.

Pedestrian Safety

Strong Winds

- 11.78** The results for the interim phase of the Proposed Development with the existing surrounds indicate that the wind conditions at two elevated levels do exceed the safety criterion (Points 91 and 147). This represents a Major Adverse (significant) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.
- 11.79** The wind conditions in all other areas on and off-site are rated as safe for pedestrians and cyclist use throughout the year.

Figure 11.15 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Comfort Results, Winter Season, Ground

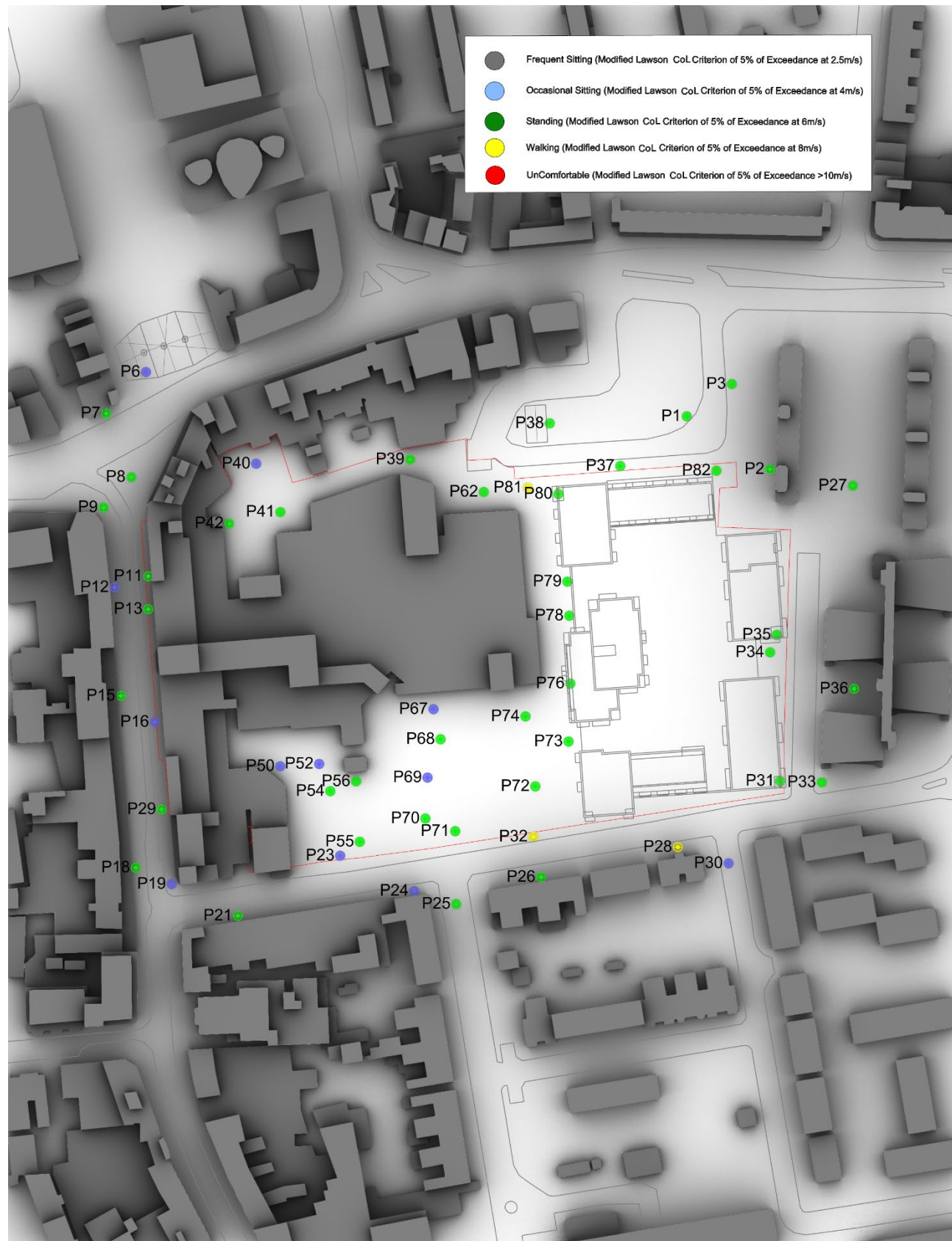


Figure 11.16 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Comfort Results, Summer Season, Ground

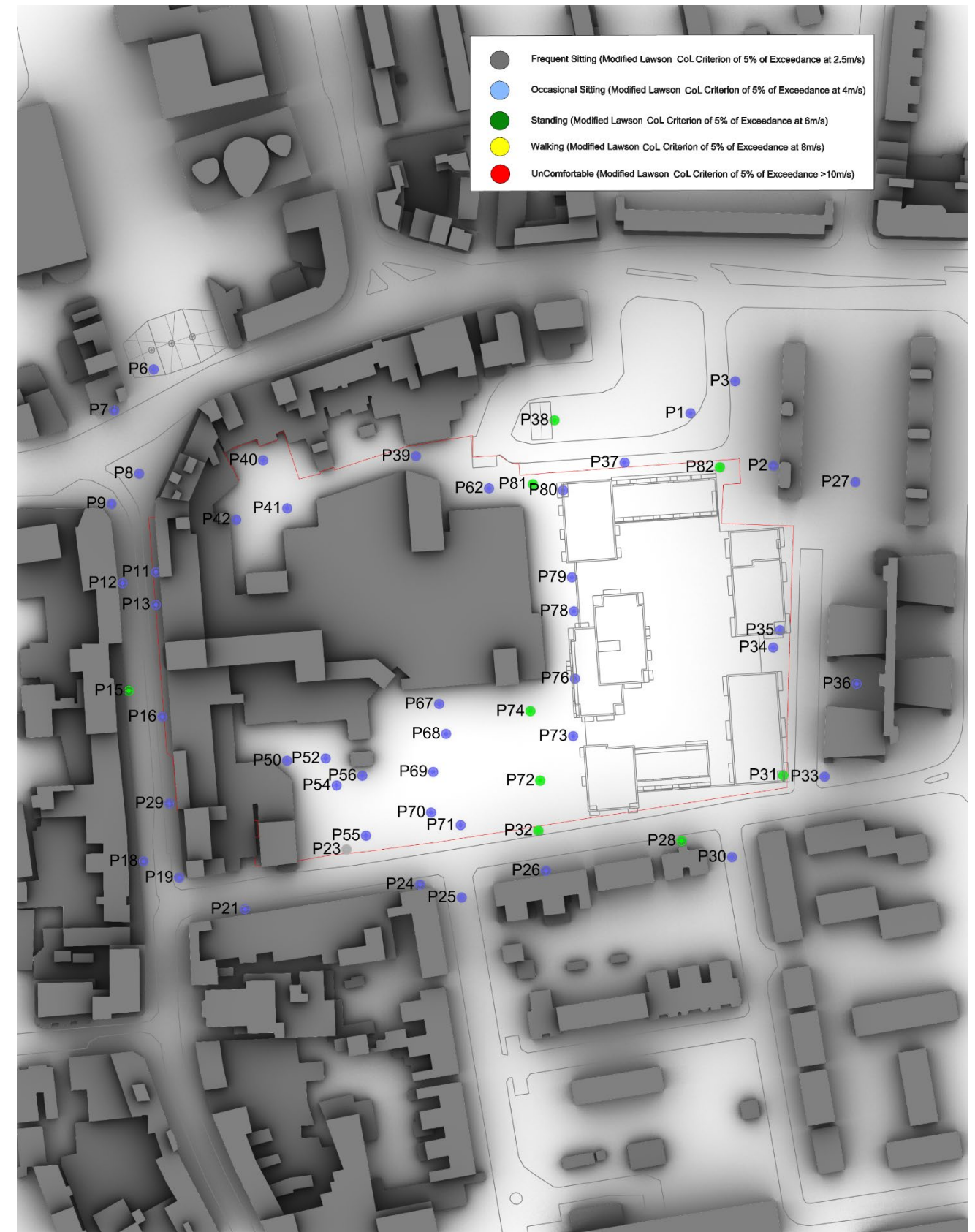


Figure 11.17 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Comfort Results, Summer Season, Elevated Podium Amenity



Figure 11.18 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Comfort Results, Summer Season, Elevated Balcony Lower Levels

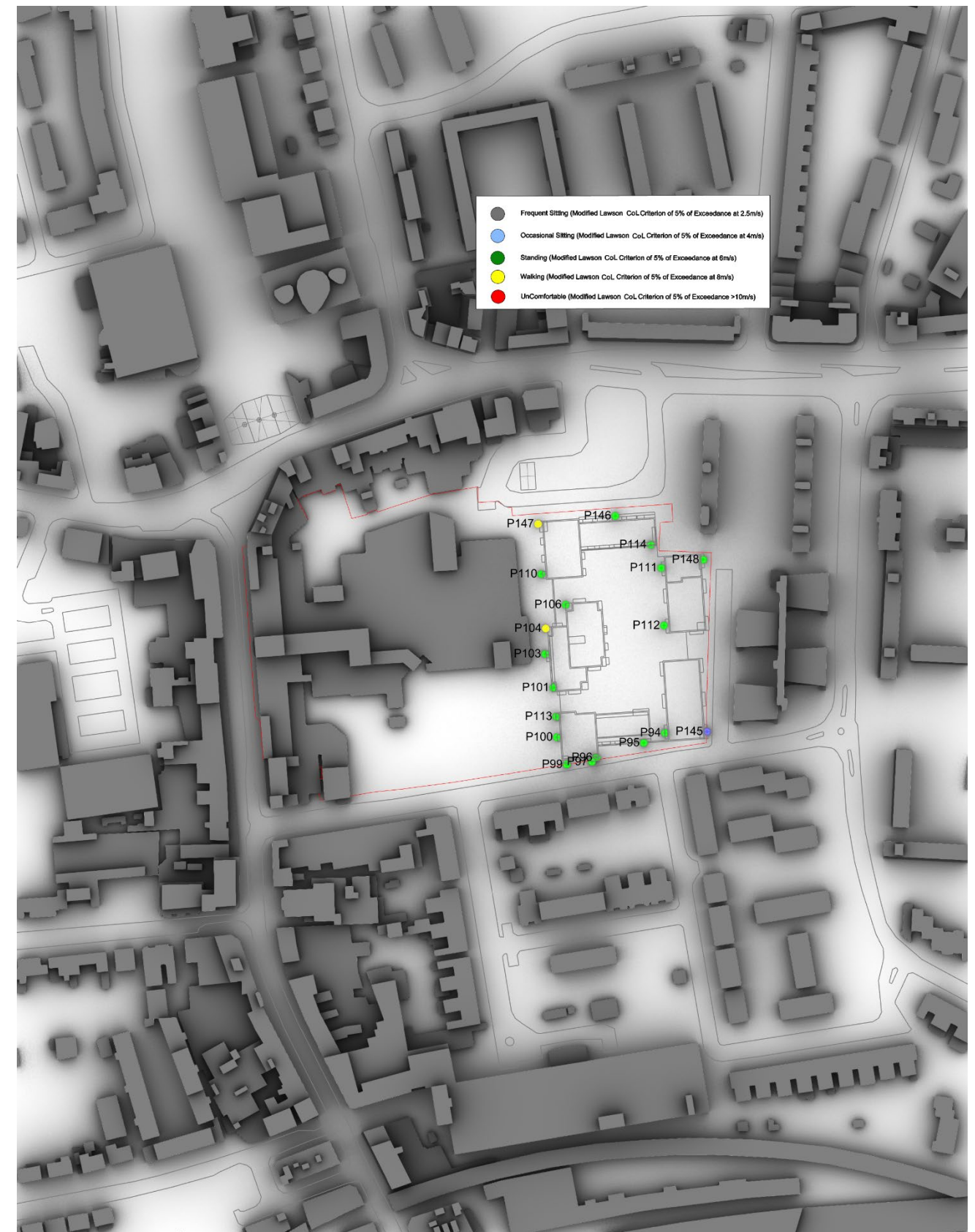


Figure 11.19 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Comfort Results, Summer Season, Elevated Balcony Upper Levels

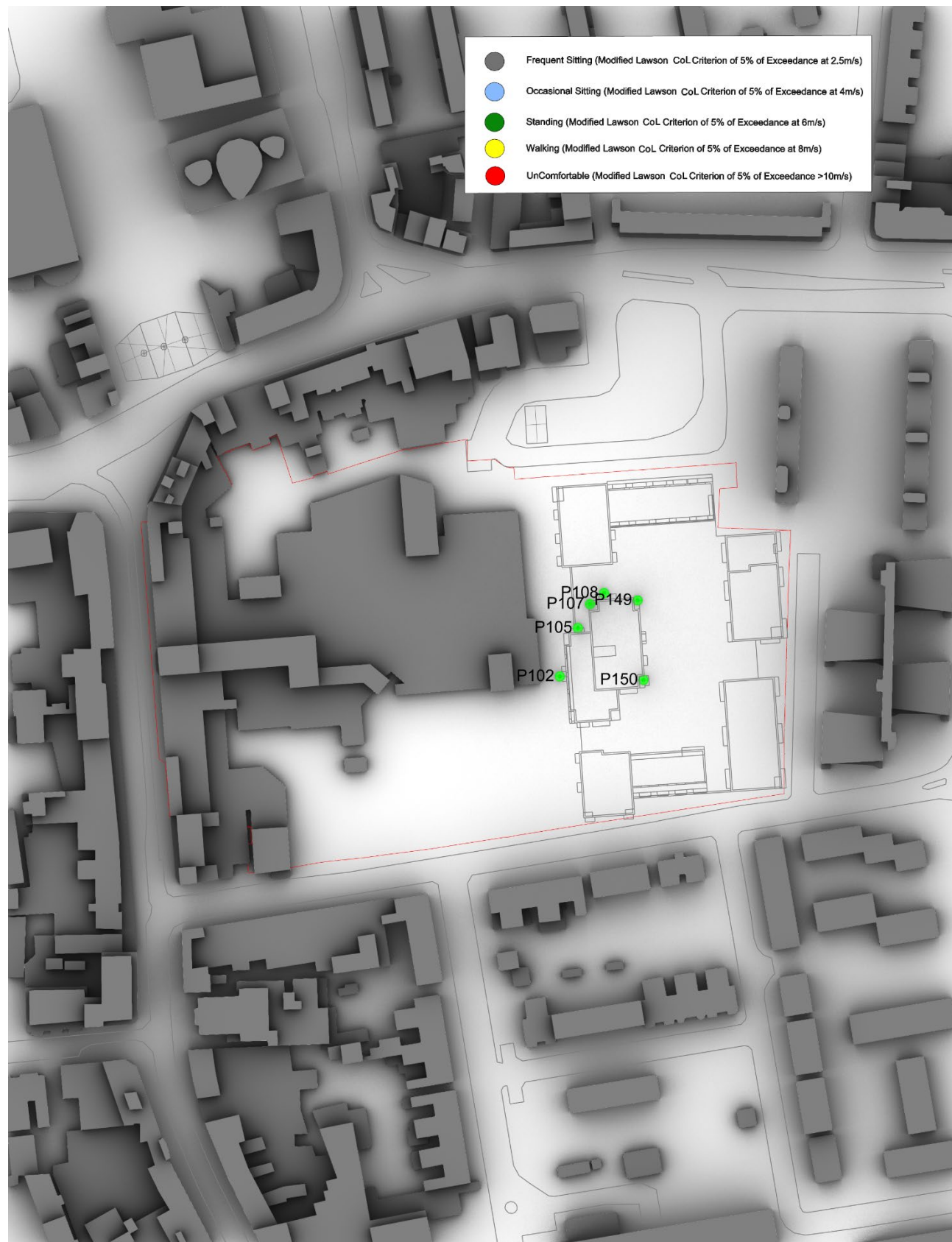


Figure 11.20 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Comfort Results, Summer Season, Elevated Terraces Upper Levels

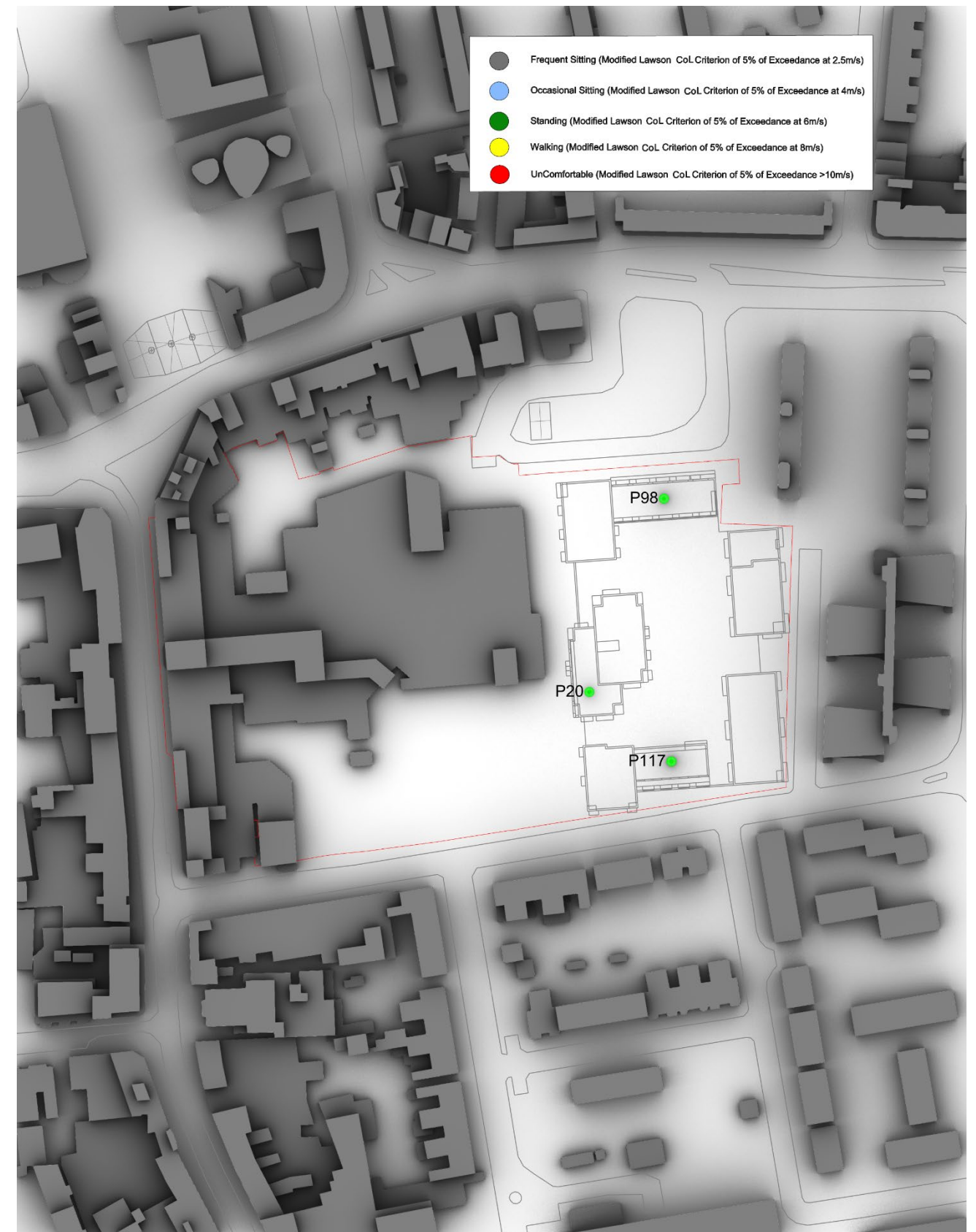


Figure 11.21 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Safety Results, Annual, Ground Level



Figure 11.22 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Safety Results, Annual, Elevated Podium Amenity

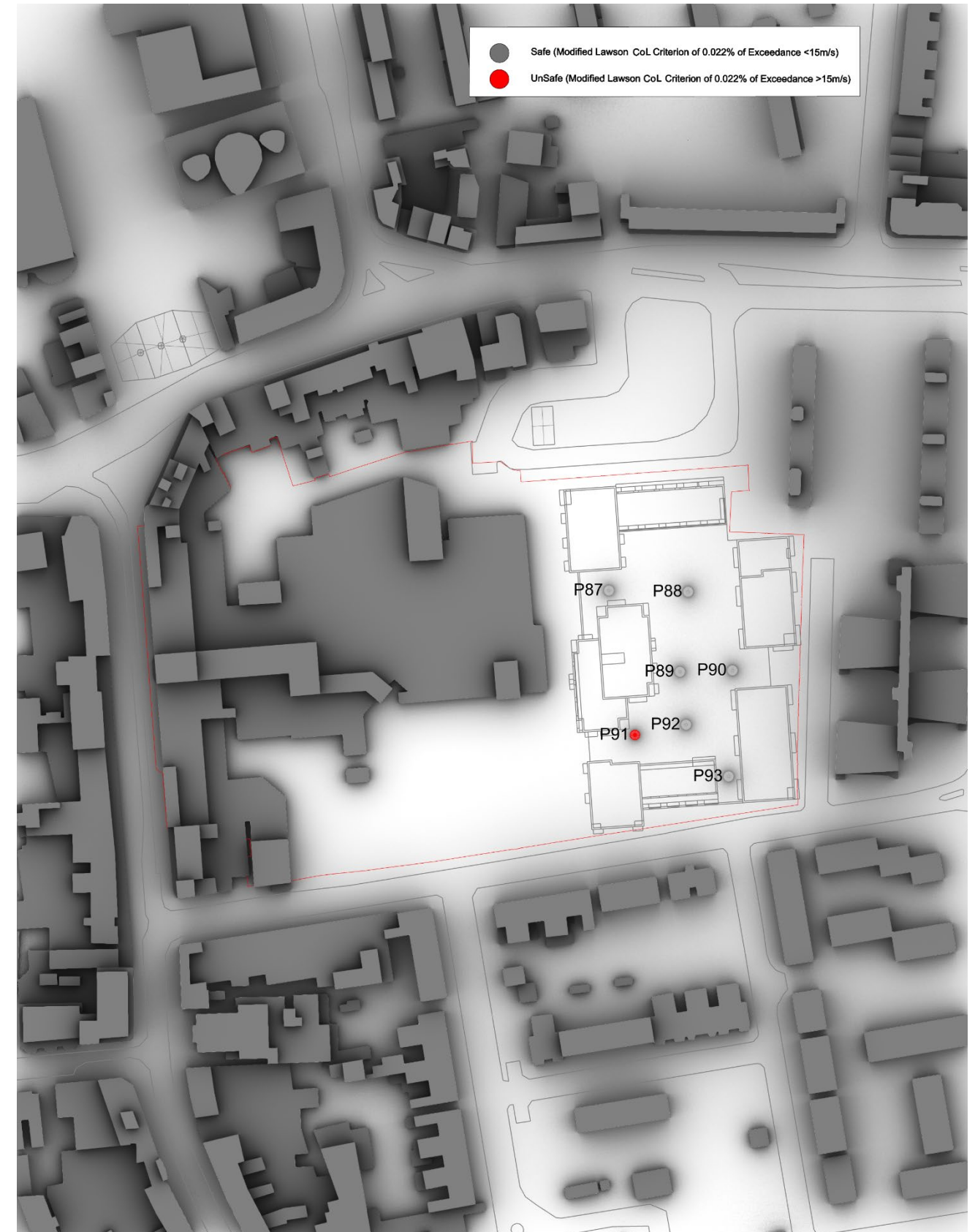


Figure 11.23 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Safety Results, Annual, Elevated Balcony Lower Levels



Figure 11.24 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Safety Results, Annual, Elevated Balcony Upper Levels



Figure 11.25 Wind Tunnel Results – Configuration 2: Interim Phase of the Proposed Development with Existing Surrounds, Safety Results, Annual, Elevated Terraces Upper Levels



Completed Development

Configuration 3: Completed Development with Existing Surrounds

11.80 Wind conditions for Configuration 3: Completed Development with Existing Surrounds are presented in Figure 11.26 to Figure 11.36.

Pedestrian Comfort

Thoroughfares

11.81 In the presence of the Completed Development with Existing Surrounds, at ground level, the wind conditions at thoroughfares range from frequent sitting to walking during the worst season (winter). Hence, the wind conditions at all the thoroughfares at the site and within the surrounds are suitable for pedestrian and cyclist use throughout the year. This represents from Negligible (not significant) to Major Beneficial (not significant) effects.

Entrances

11.82 The wind microclimate outside the entrance of the Completed Development with Existing Surrounds at Point 11 exceeds the comfort criterion for ingress/egress throughout the year. This represents a Moderate Adverse (significant) effect as discussed in Configuration 4 With Landscaping Assessment and the 'Mitigation, Monitoring and Residual Effects' section.

11.83 Wind conditions at the remainder of entrances on-site would be suitable for frequent sitting to standing during the worst season (winter). This represents Moderate Beneficial (not significant) to Negligible (not significant) effects.

Seating Areas / Play Areas / Outdoor Amenity Spaces

11.84 The play areas P27 and P40 of the Completed Development with Existing Surrounds are suitable for seating and standing during the summer season, experiencing occasional sitting and frequent sitting wind conditions, respectively. This represents a Moderate Beneficial (not significant) effect at each location.

11.85 The wind microclimate at outdoor amenity spaces, e.g. proposed café and seating areas within the Proposed Development, at Points 48, 49, 57, 58, 66 and 69 exceed the comfort criterion of frequent sitting and occasional sitting during the summer season. This is one category windier in most cases and represents a Moderate Adverse (**significant**) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.

11.86

11.87 The wind microclimate at outdoor amenity spaces at Points 34, 36, 39, 44, 46, 50, 52, 55, 60, 62, 67, 68, 71, 73, 74, 78 and 81 are suitable for occasional sitting and standing during the summer season. This represents Moderate Beneficial (not significant) to Negligible (not significant) effects.

Roads

11.88 The roads of the Completed Development with Existing Surrounds are suitable for walking during the worst season (winter). This represents a Negligible (not significant) effect.

Pedestrian Crossings

11.89 The pedestrian crossings of the Completed Development with Existing Surrounds are suitable for standing during the worst season (winter). This represents a Negligible (not significant) effect.

Bus Stops

- 11.90** The bus stops of the Completed Development with Existing Surrounds are suitable for standing during the worst season (winter). This represents a Negligible (not significant) effect.

Podium and Terraces

- 11.91** The podium and terraces of the Completed Development with Existing Surrounds at Points 4, 5, 20, 84, 87, 88, 89, 90, 91, 92, 93, 98, 117 and 128 exceed the comfort criterion for occasional sitting and standing during the summer season. This is one category windier in most cases and represents a Moderate Adverse (**significant**) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.
- 11.92** Wind conditions at Points 83, 84, 85, 86 and 118 are suitable for occasional sitting during the summer season, therefore represents a Negligible (not significant) effect.

Private Balconies

- 11.93** The private balconies of the Completed Development with Existing Surrounds at Points 94, 95, 96, 97, 99, 100, 101, 103, 104, 105, 106, 107, 108, 110, 111, 112, 113, 114, 115, 116, 119, 120, 122, 123, 127, 128, 130, 131, 132, 134, 135, 137, 138, 139, 141, 146, 147, 148, 149, 150 experience standing conditions, and therefore exceed the comfort criterion for occasional sitting during the summer season. This is one category windier in most cases and represents a Moderate Adverse (**significant**) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.
- 11.94** The private balconies of the Completed Development with Existing Surrounds at Points 102, 129 and 143, experience walking conditions and therefore exceed the comfort criterion for occasional sitting during the summer season. This is two categories windier for private balconies and represents a Moderate Adverse (significant) effect.
- 11.95** The remaining private balconies of the Completed Development with Existing Surrounds (Points 121, 124, 125, 126, 133, 136, 140, 142, 144, 145) experience wind conditions suitable for occasional sitting wind, representing a Negligible (not significant) effect.

Pedestrian Safety

Strong Winds

- 11.96** The results for the Completed Development with Existing Surrounds indicate that the wind conditions at three elevated levels do exceed the safety criterion (Points 20, 102 and P143). This represents a Major Adverse (significant) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.
- 11.97** The wind conditions in all other areas on and off-site are rated as safe for pedestrians and cyclist use throughout the year.

Figure 11.26 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Comfort Results, Winter Season, Ground

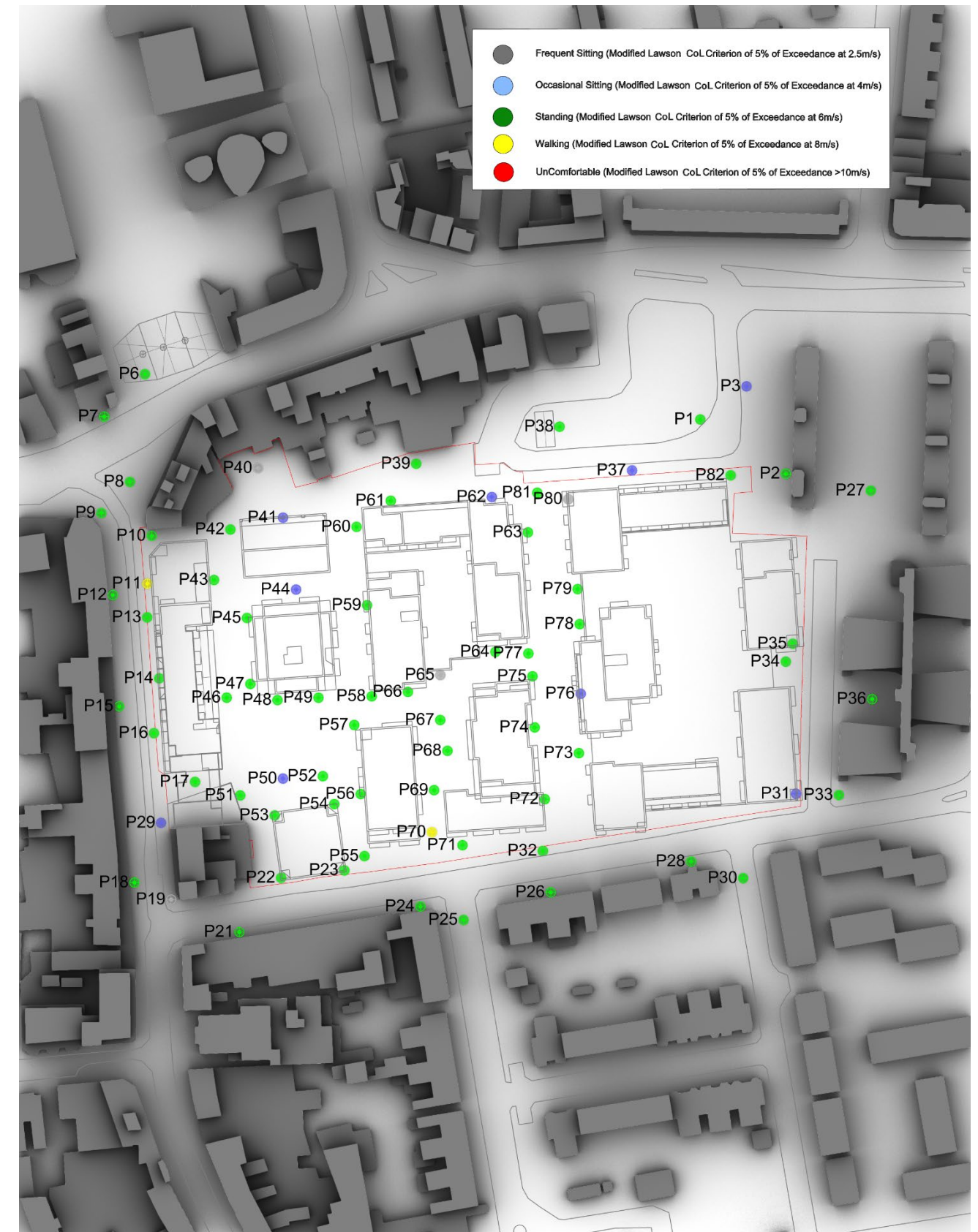


Figure 11.27 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Comfort Results, Summer Season, Ground

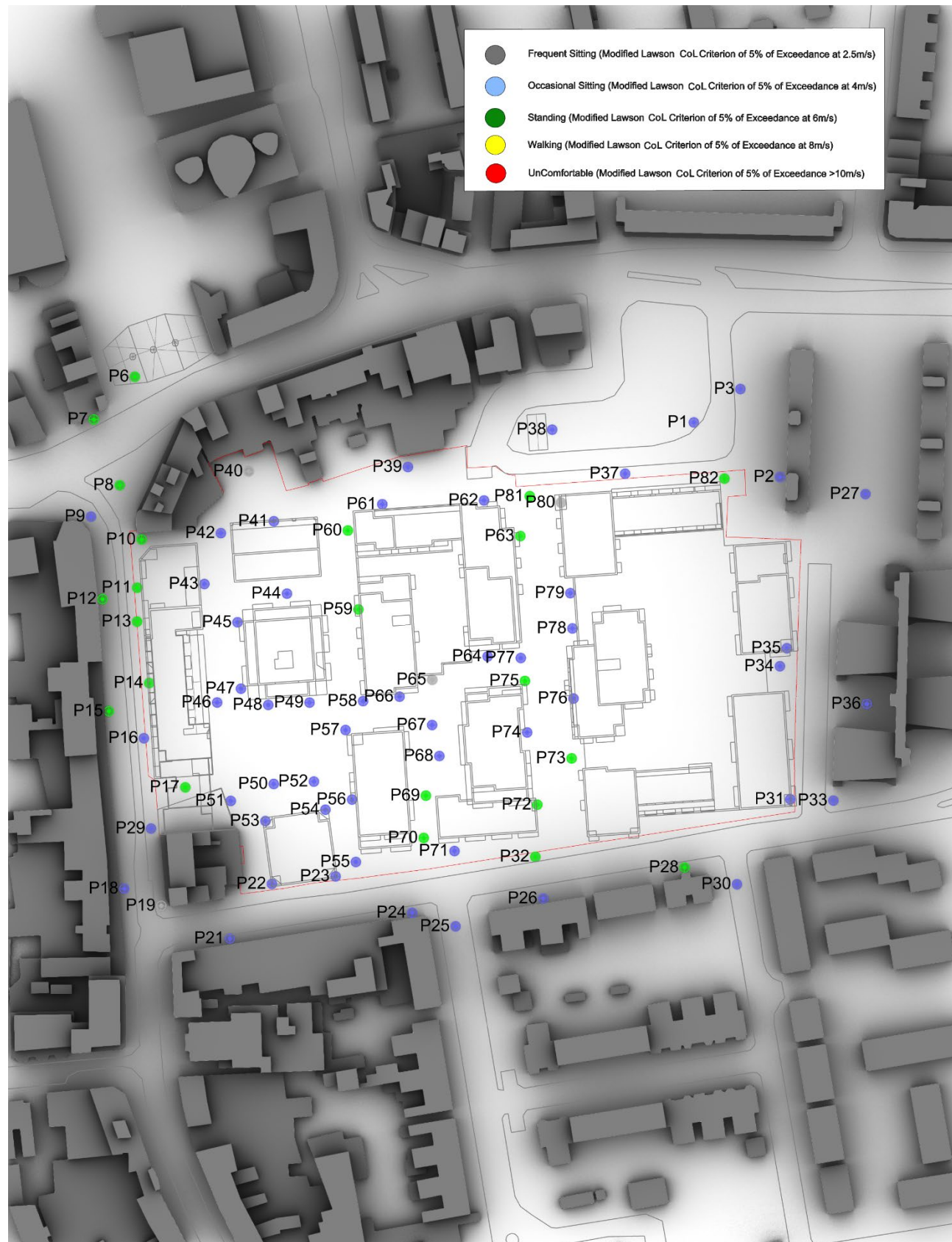


Figure 11.28 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Comfort Results, Summer Season, Elevated Podium Amenity

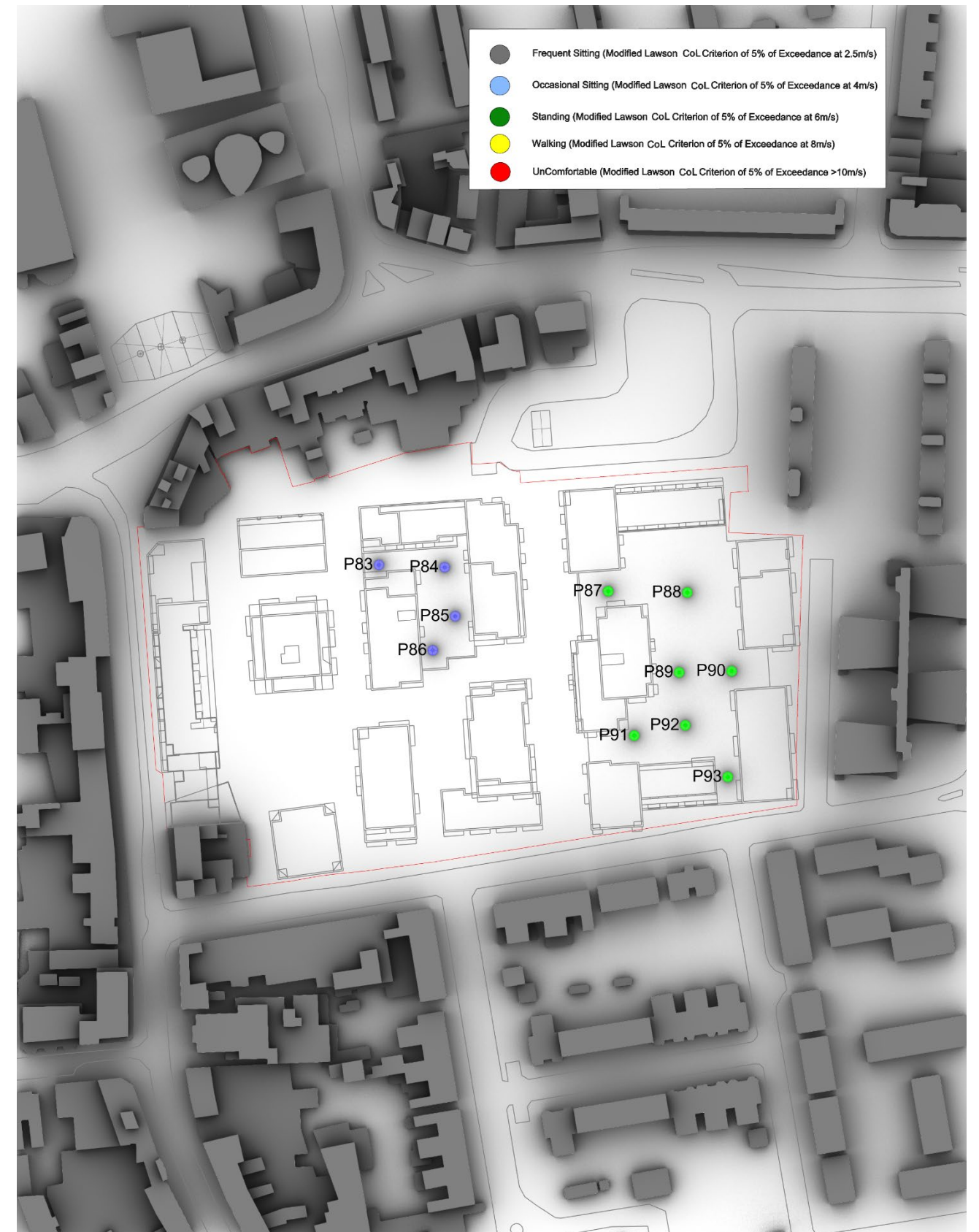


Figure 11.29 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Comfort Results, Summer Season, Elevated Balcony Lower Levels

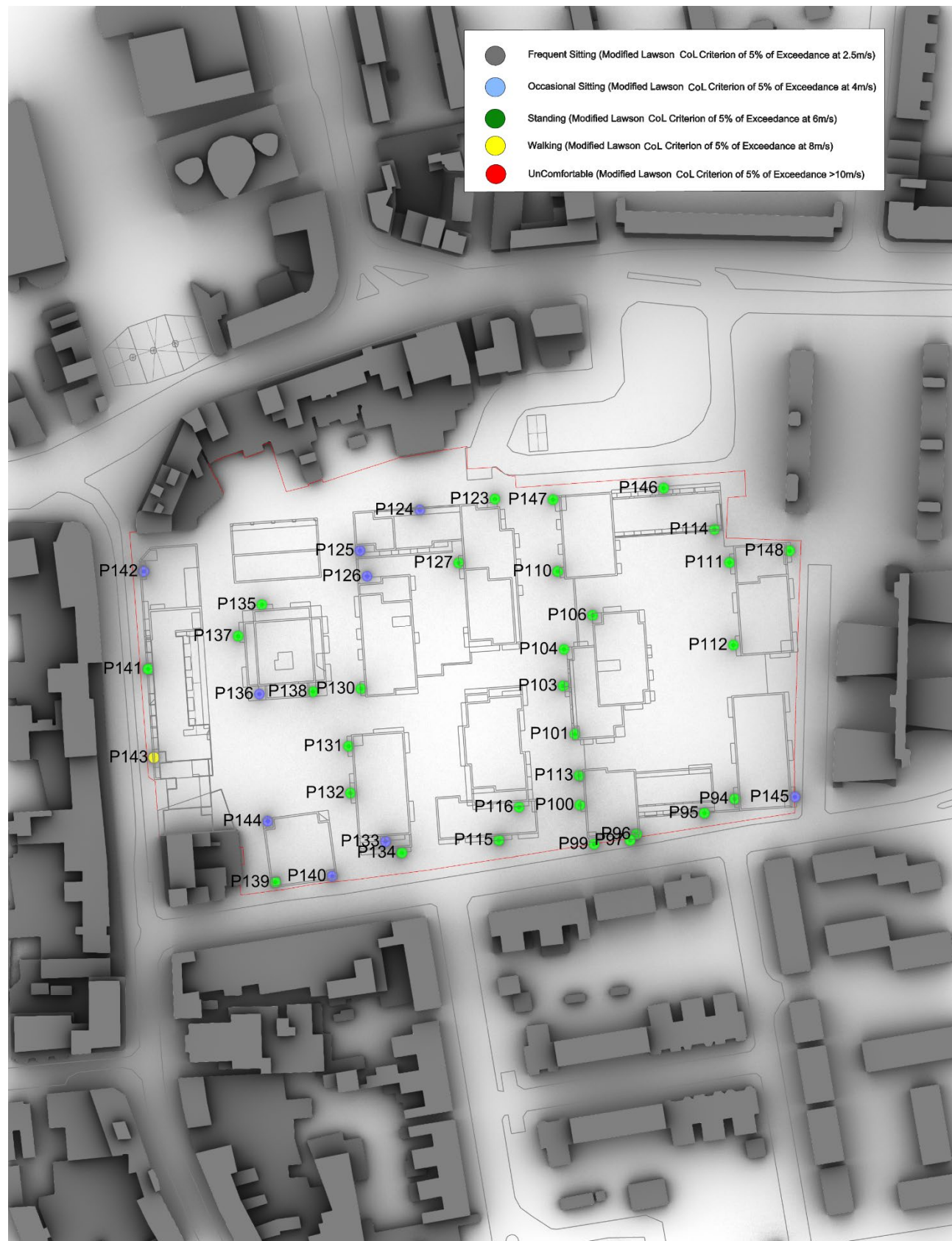


Figure 11.30 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Comfort Results, Summer Season, Elevated Balcony Upper Levels

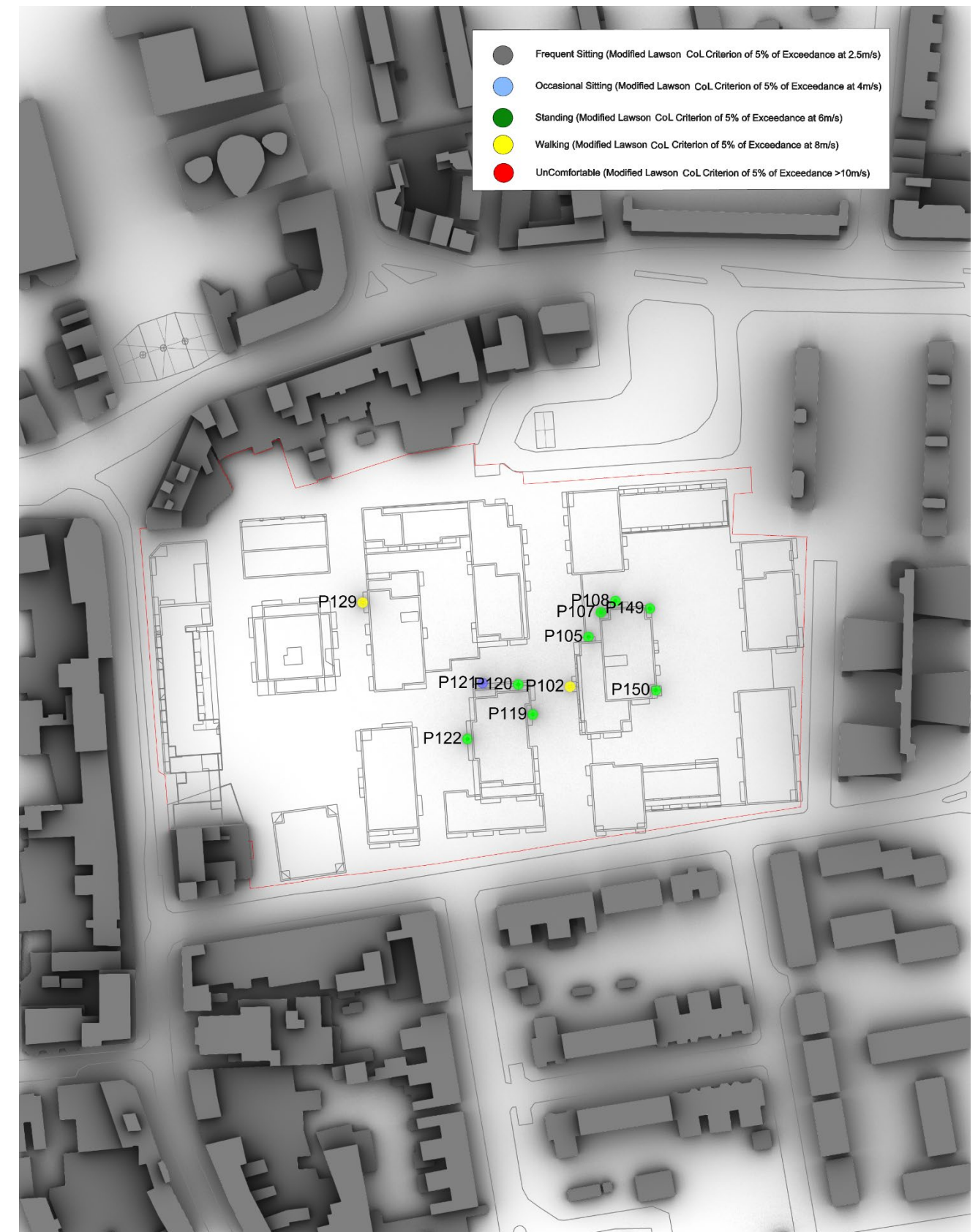


Figure 11.31 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Comfort Results, Summer Season, Elevated Terraces Upper Levels

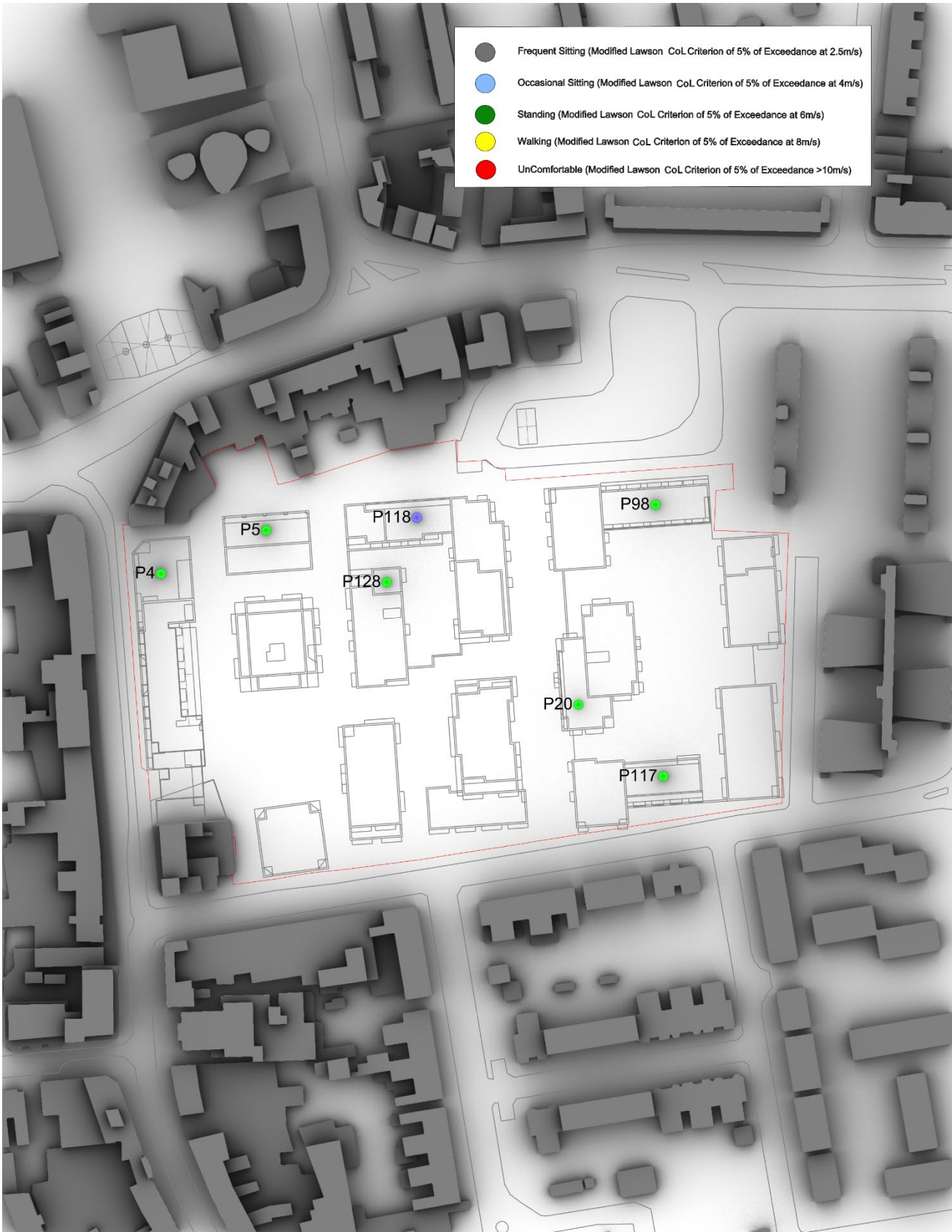


Figure 11.32 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Safety Results, Annual, Ground Level

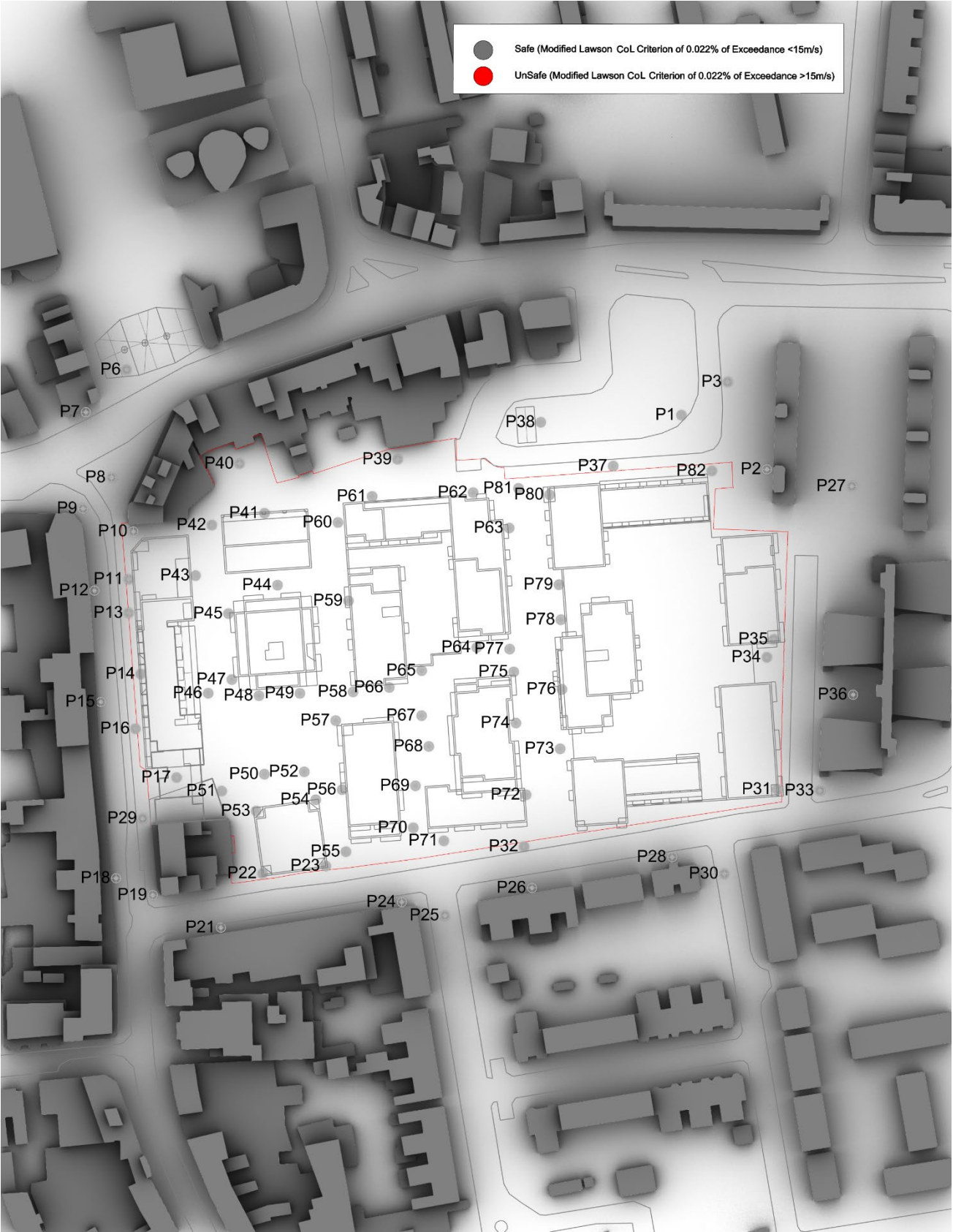


Figure 11.33 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Safety Results, Annual, Elevated Podium Amenity



Figure 11.34 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Safety Results, Annual, Elevated Balcony Lower Levels

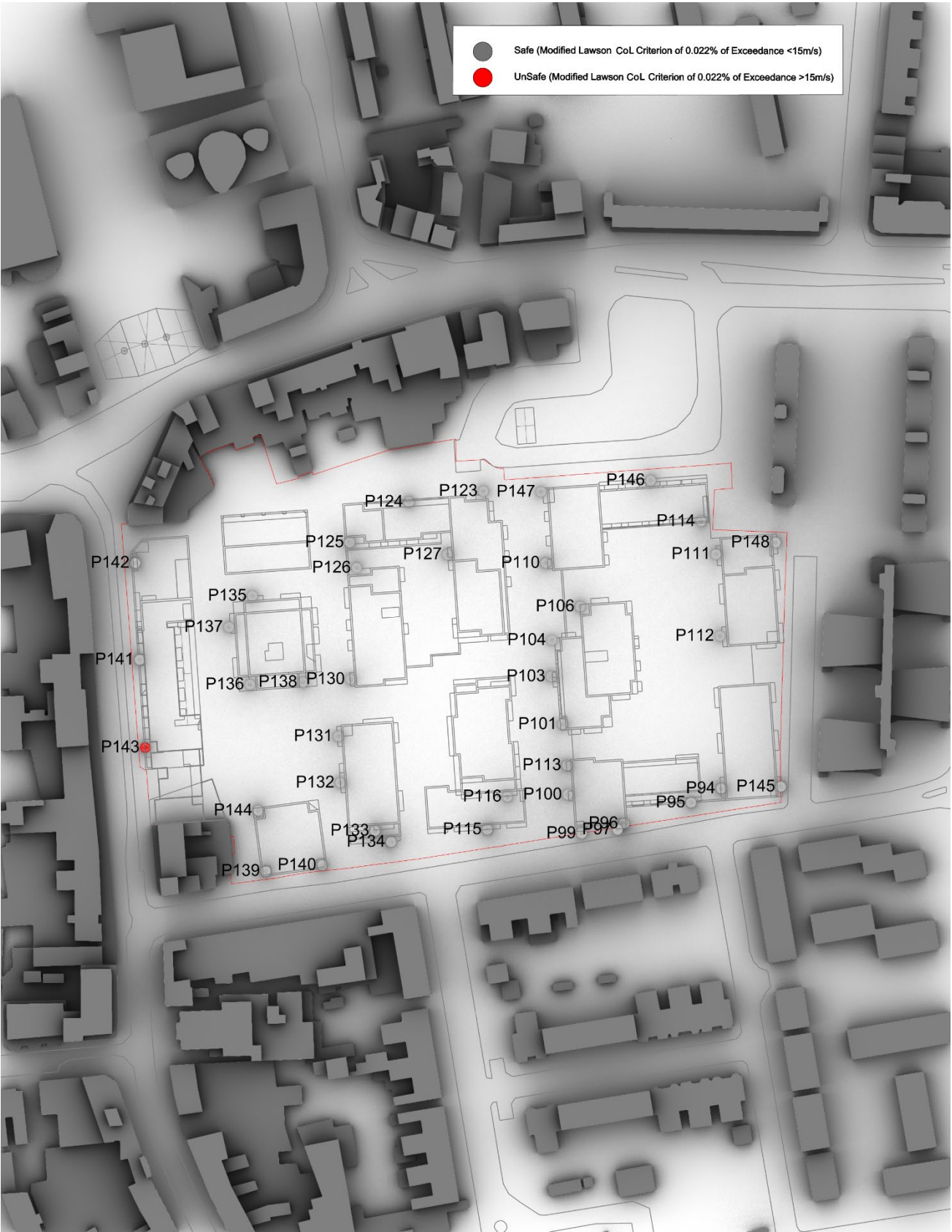


Figure 11.35 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Safety Results, Annual, Elevated Balcony Upper Levels



Figure 11.36 Wind Tunnel Results – Configuration 3: Completed Proposed Development with Existing Surrounds, Safety Results, Annual, Elevated Terraces Upper Levels



Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping

11.98 Wind conditions for Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping are presented in Figure 11.37 to Figure 11.47 and the tested landscaping are presented in Figure 11.48 to Figure 11.52.

Pedestrian Comfort

Thoroughfares

11.99 In the presence of the Completed Development with Existing Surrounds and Proposed Landscaping, at ground level, the wind conditions at thoroughfares range from frequent sitting to walking during the worst season (winter). Hence, the wind conditions at all the thoroughfares at the site and within the surrounds are suitable for pedestrian and cyclist use throughout the year. This represents Negligible (not significant) to Moderate Beneficial (not significant) effects, with the exception of P6, which as the wind conditions are one category windier than the baseline scenario (Configuration 1), but are still suitable for use, this represents a Moderate Adverse (not significant) effect.

Entrances

11.100 The wind microclimate outside the entrance of the Completed Development with Existing Surrounds and Proposed Landscaping at Points 38 (off-site) and 53 (on-site) exceed the comfort criterion for ingress/egress of standing throughout the year. This represents a Major Adverse (significant) and a Moderate Adverse (significant) effect, respectively.

11.101 Wind conditions at the remainder of entrances on-site would be suitable for frequent sitting to standing during the worst season (winter). This represents Moderate Beneficial (not significant) to Negligible (not significant) effects.

11.102 Wind conditions at off-site entrance locations P12 and P24 experience standing conditions during the windiest season, which is suitable for use, however is windier than the baseline scenario (Configuration 1), and therefore represents a Moderate Adverse (not significant) effect.

Seating Areas / Play Areas / Outdoor Amenity Spaces

11.103 The play areas of the Completed Development with Existing Surrounds and Proposed Landscaping P27 and P40 are suitable for seating and standing during the summer season. This represents a Moderate Beneficial (not significant) and Negligible (not significant) effect, respectively.

11.104 The wind microclimate at outdoor amenity spaces, e.g. café and seating area within the Proposed Development, at Points 48, 49, 57, 58 and 66 exceed the comfort criterion of frequent sitting and occasional sitting during the summer season. This represents a Moderate Adverse (**significant**) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.

11.105 The wind microclimate at outdoor amenity spaces 34, 36, 39, 44, 46, 50, 52, 55, 60, 62, 68, 73, 74, 78 and 81 are suitable for occasional sitting and standing during the summer season. This represents Moderate Beneficial (not significant) to Negligible (not significant) effects.

11.106 The wind microclimate at outdoor amenity spaces 67 and 69 exceed the comfort criterion of frequent sitting and occasional sitting during the summer season. This represents a Moderate Adverse (significant) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.

Roads

11.107 The roads of the Completed Development with Existing Surrounds and Proposed Landscaping are suitable for walking during the worst season (winter). Point 25 experiences standing conditions and Point 30 experiences occasional sitting conditions, representing a Negligible (not significant) effect, at both locations.

Pedestrian Crossings

11.108 The pedestrian crossings of the Completed Development with Existing Surrounds and Proposed Landscaping are suitable for standing during the worst season (winter). This represents a Negligible (not significant) effect.

Bus Stops

11.109 The bus stops of the Completed Development with Existing Surrounds and Proposed Landscaping are suitable for standing during the worst season (winter), experiencing occasional sitting to standing wind conditions. This represents a Negligible (not significant) effect.

Podium and Terraces

11.110 The podium and terraces of the Completed Development with Existing Surrounds and Proposed Landscaping at Points 4, 5, 20, 84, 86, 87, 89, 90, 91, 98 and 117 exceed the comfort criterion for occasional sitting and standing during the summer season. This is one category windier and represents a Moderate Adverse (significant) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.

11.111 Points 83, 84, 85, 86, 88, 89, 90, 92, 93, 118 and 128 experience frequent sitting to occasional sitting wind conditions during the summer season, therefore representing a Negligible (not significant) effect.

Private Balconies

11.112 The private balconies of the Completed Development with Existing Surrounds and Proposed Landscaping at Points 94, 95, 96, 97, 99, 100, 101, 103, 104, 105, 106, 107, 108, 110, 112, 113, 115, 116, 119, 120, 122, 123, 125, 127, 130, 131, 132, 134, 135, 137, 138, 139, 141, 146, 148, 149, 150 experience standing conditions, and therefore exceed the comfort criterion for occasional sitting during the summer season. This represents a Moderate Adverse (significant) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.

11.113 The private balconies of the Completed Development with Existing Surrounds at Points 102 and 129 experience walking conditions and therefore exceed the comfort criterion for occasional sitting during the summer season. This represents a Moderate Adverse (**significant**) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.

11.114 The private balcony at Point 143 experiences uncomfortable wind conditions, therefore representing a Major Adverse (significant) effect.

11.115 The remaining private balconies of the Completed Development with Existing Surrounds (Points 111, 114, 121, 124, 125, 126, 133, 136, 140, 142, 144, 145 and 147) experience wind conditions suitable for occasional sitting wind, representing a Negligible (not significant) effect.

Pedestrian Safety

Strong Winds

11.116 The results for the Completed Development with Existing Surrounds and Proposed Landscaping indicate that the wind conditions at two elevated levels do exceed the safety criterion (Points P102 and 143). This represents a Major Adverse (significant) effect and would require wind mitigation measures, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.

11.117 The wind conditions in all other areas on and off-site are rated as safe for pedestrians and cyclist use throughout the year.

Figure 11.37 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Comfort Results, Winter Season, Ground

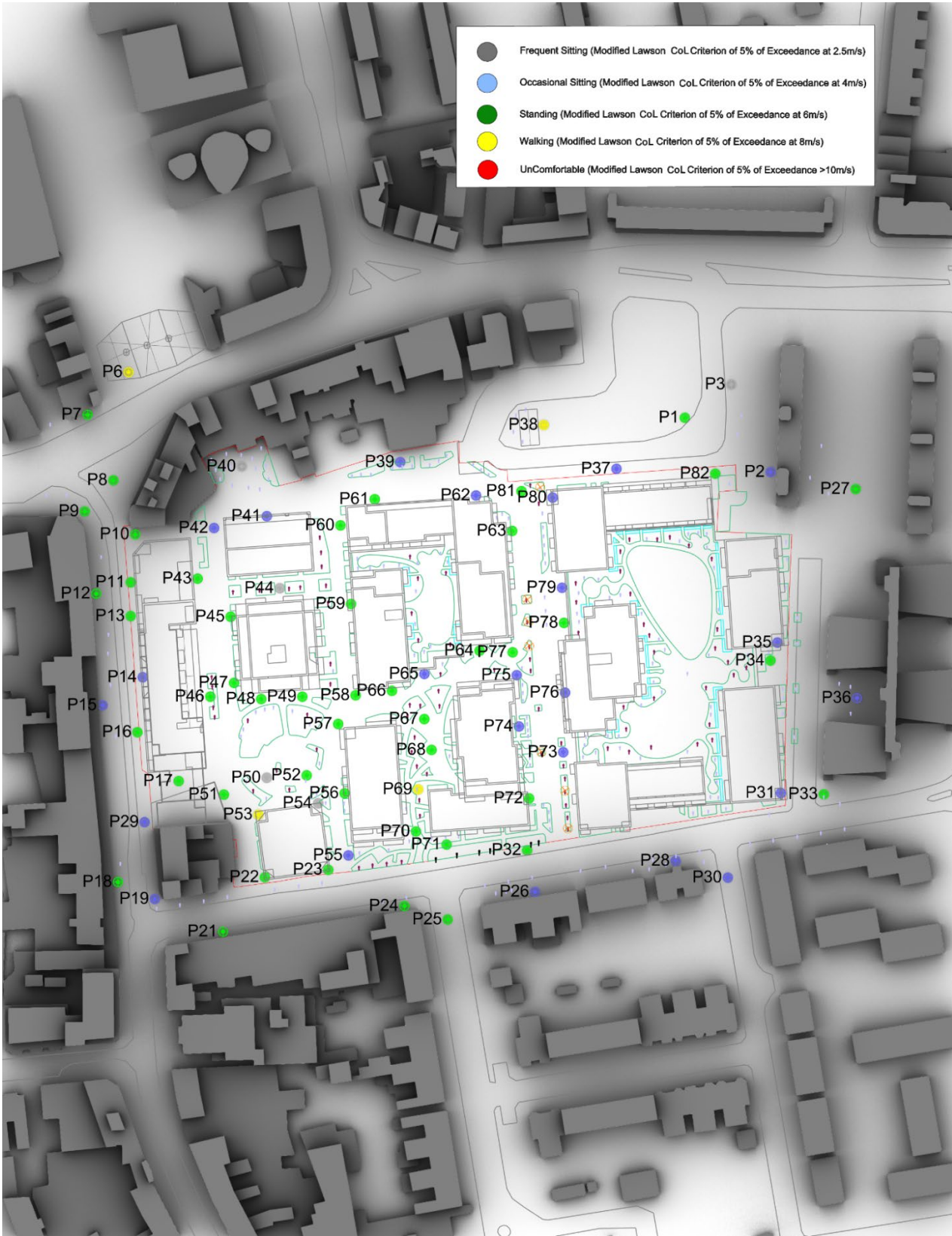


Figure 11.38 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Comfort Results, Summer Season, Ground

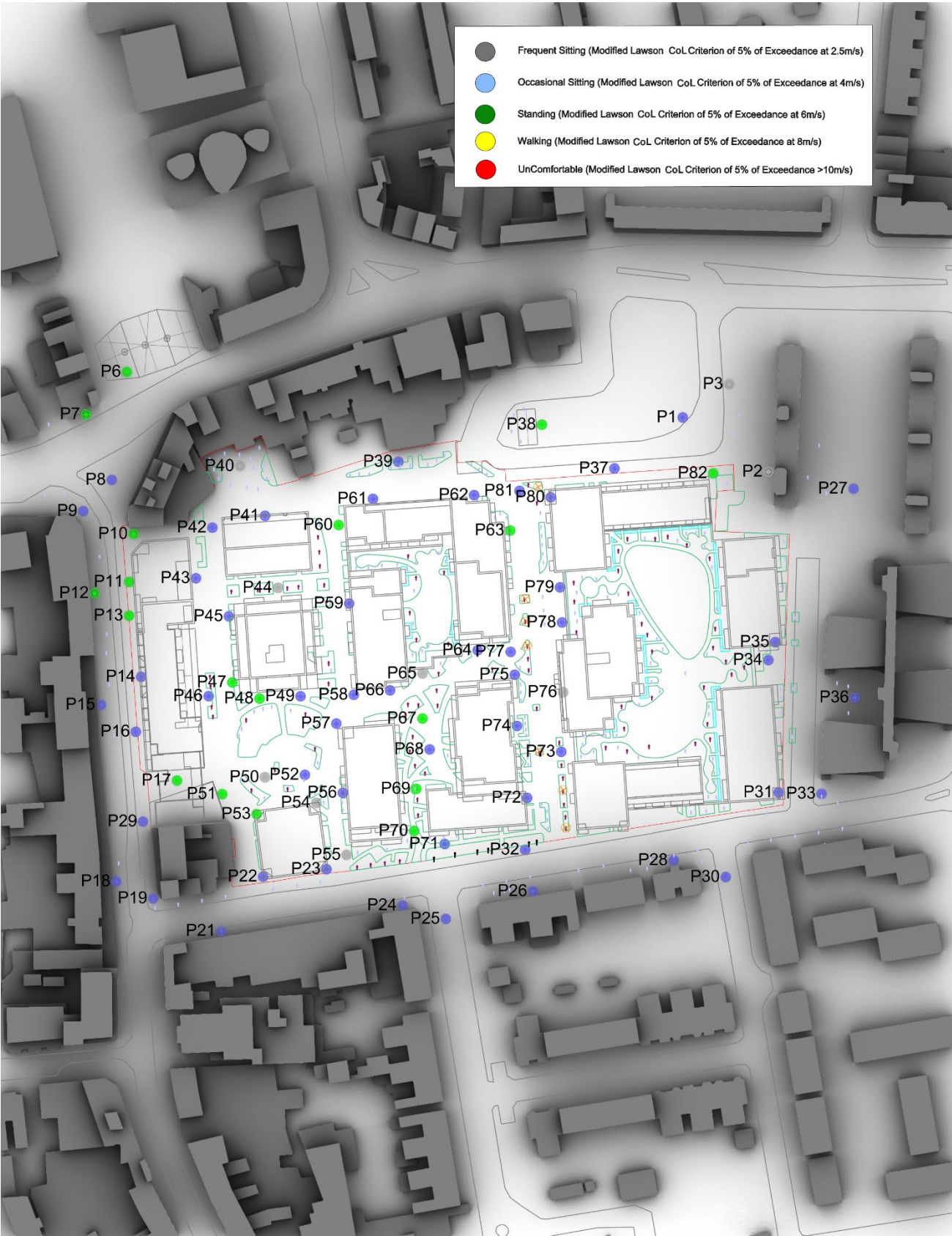


Figure 11.39 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Comfort Results, Summer Season, Elevated Podium Amenity

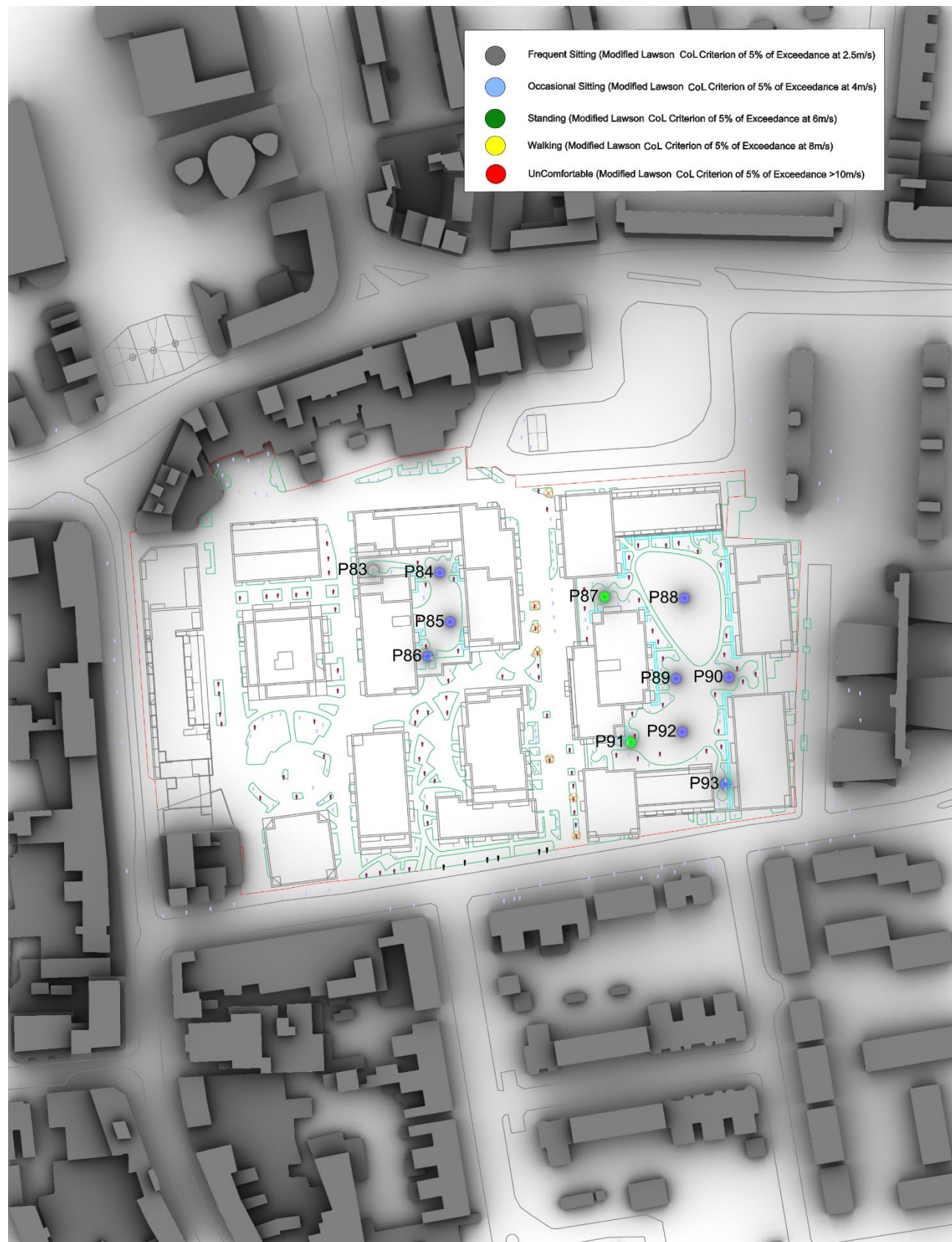


Figure 11.40 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Comfort Results, Summer Season, Elevated Balcony Lower Levels

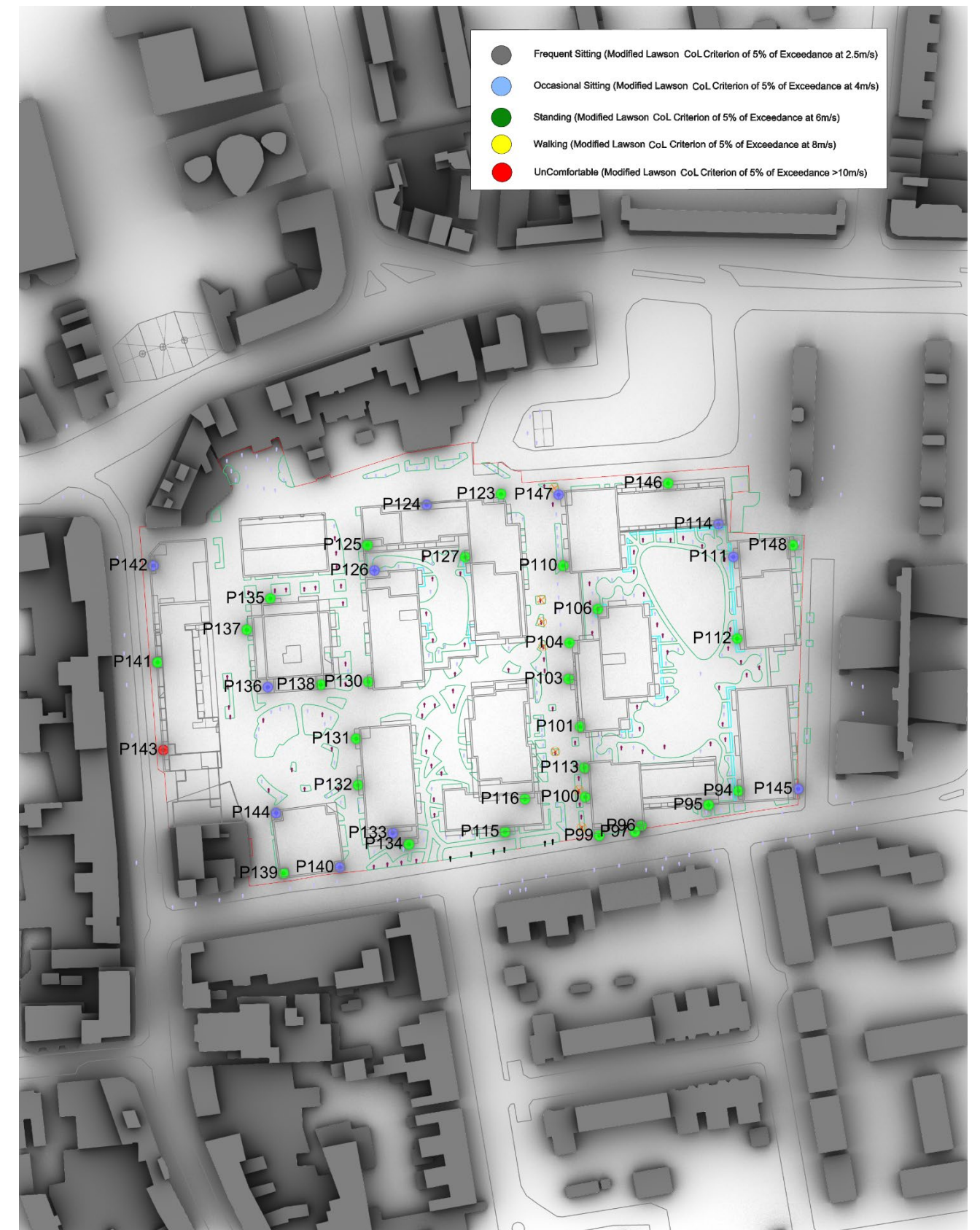


Figure 11.41 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Comfort Results, Summer Season, Elevated Balcony Upper Levels

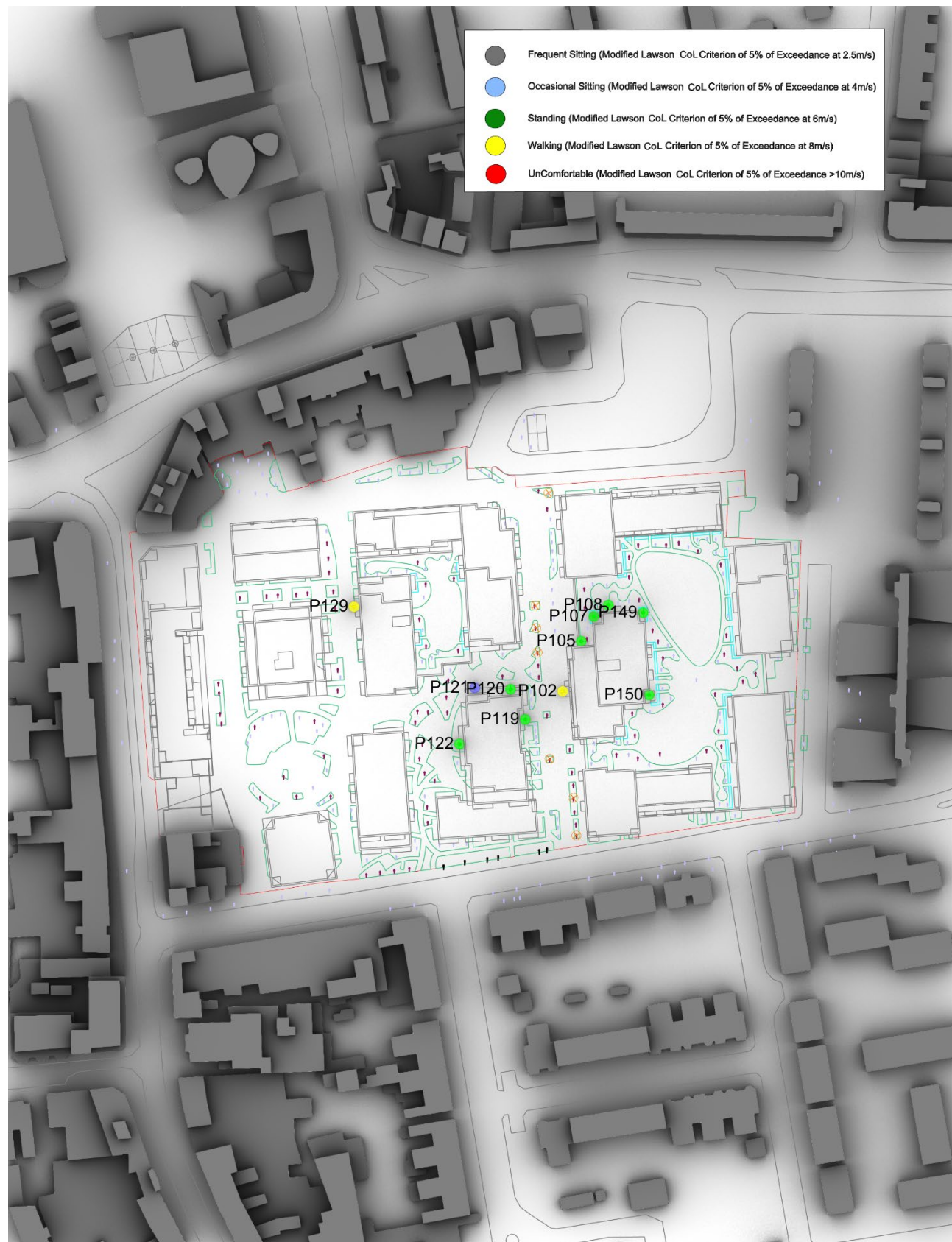


Figure 11.42 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Comfort Results, Summer Season, Elevated Terraces Upper Levels

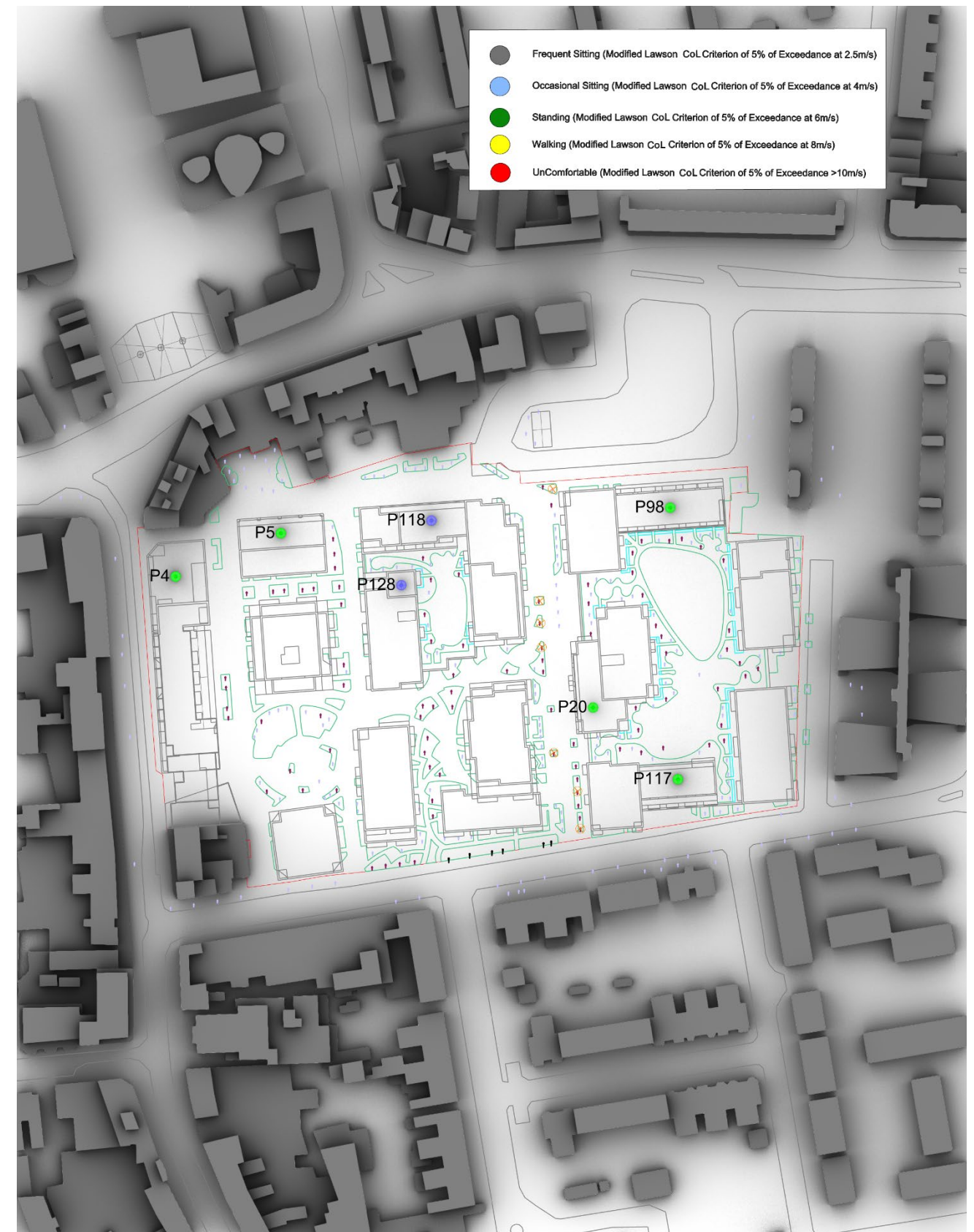


Figure 11.43 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Safety Results, Annual, Ground Level



Figure 11.44 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Safety Results, Annual, Elevated Podium Amenity



Figure 11.45 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Safety Results, Annual, Elevated Balcony Lower Levels

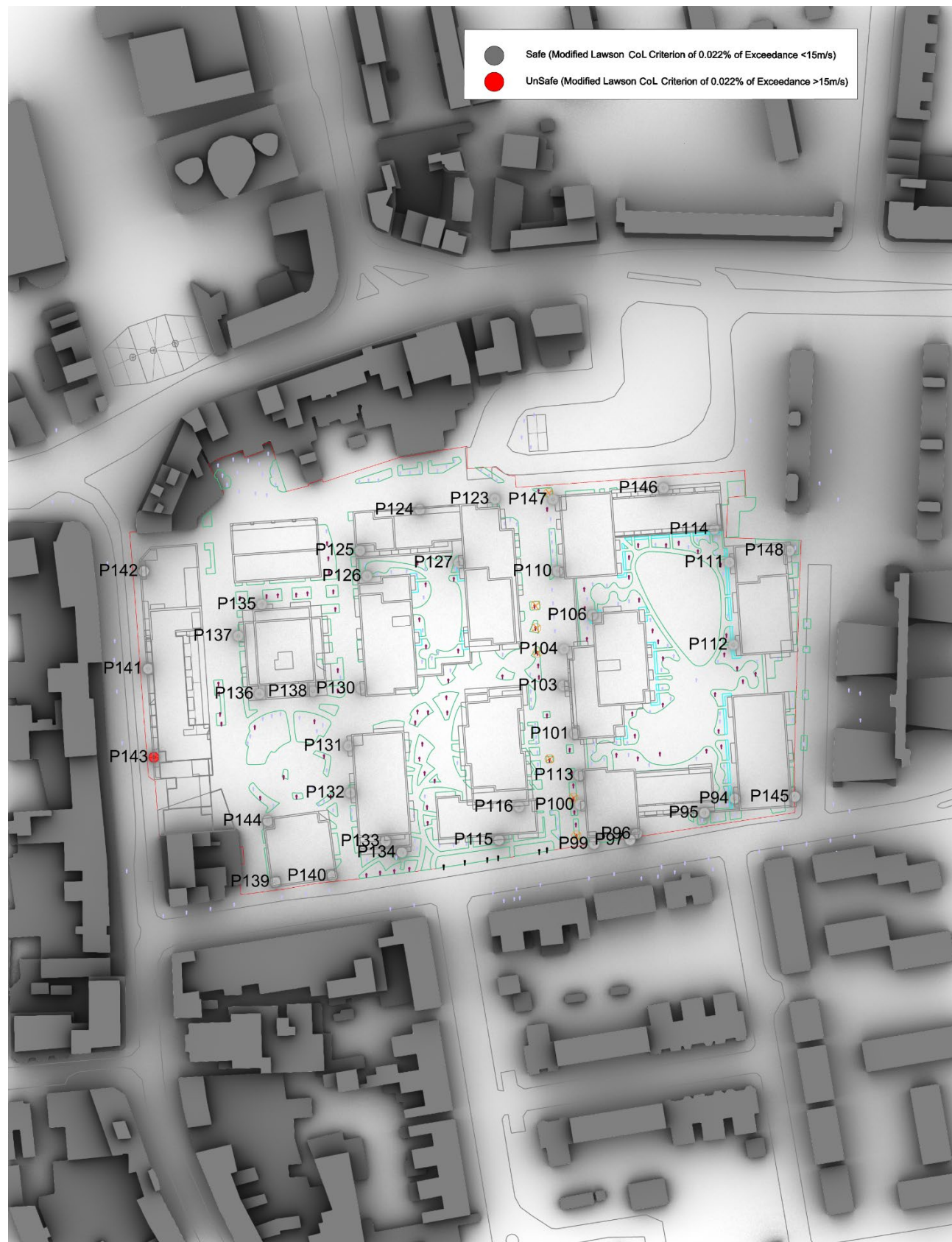


Figure 11.46 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Safety Results, Annual, Elevated Balcony Upper Levels



Figure 11.47 Wind Tunnel Results – Configuration 4: Completed Development with Existing Surrounds and Proposed Landscaping, Safety Results, Annual, Elevated Terraces Upper Levels



Figure 11.48 Mitigation Measures Tested – Plan View



Figure 11.49 Mitigation Measures Tested – 3D West Aspect

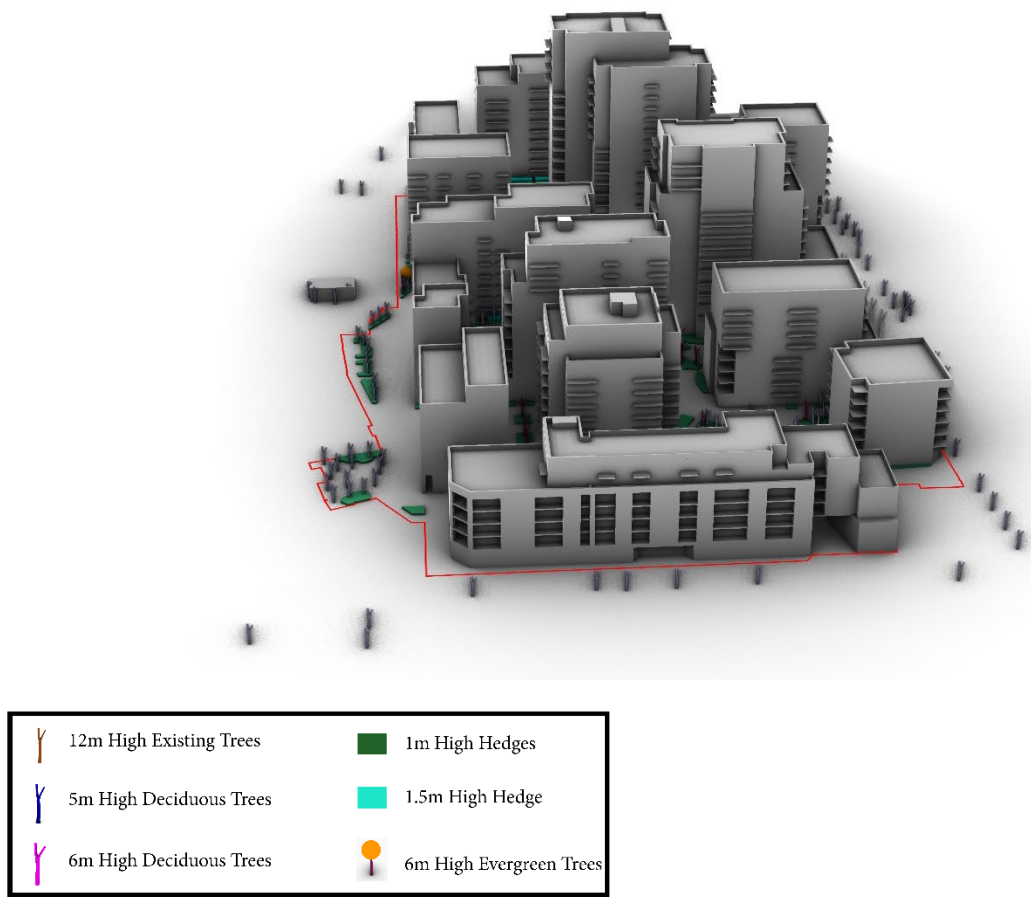


Figure 11.50 Mitigation Measures Tested – 3D East Aspect

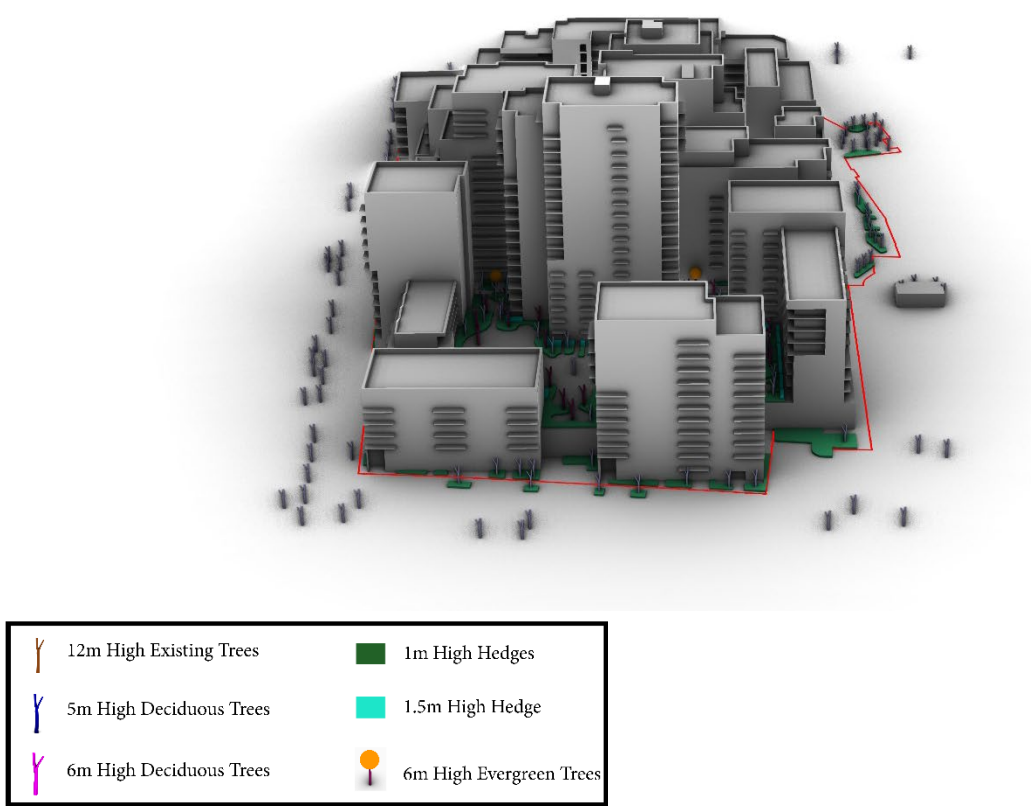


Figure 11.51 Mitigation Measures Tested – 3D North Aspect

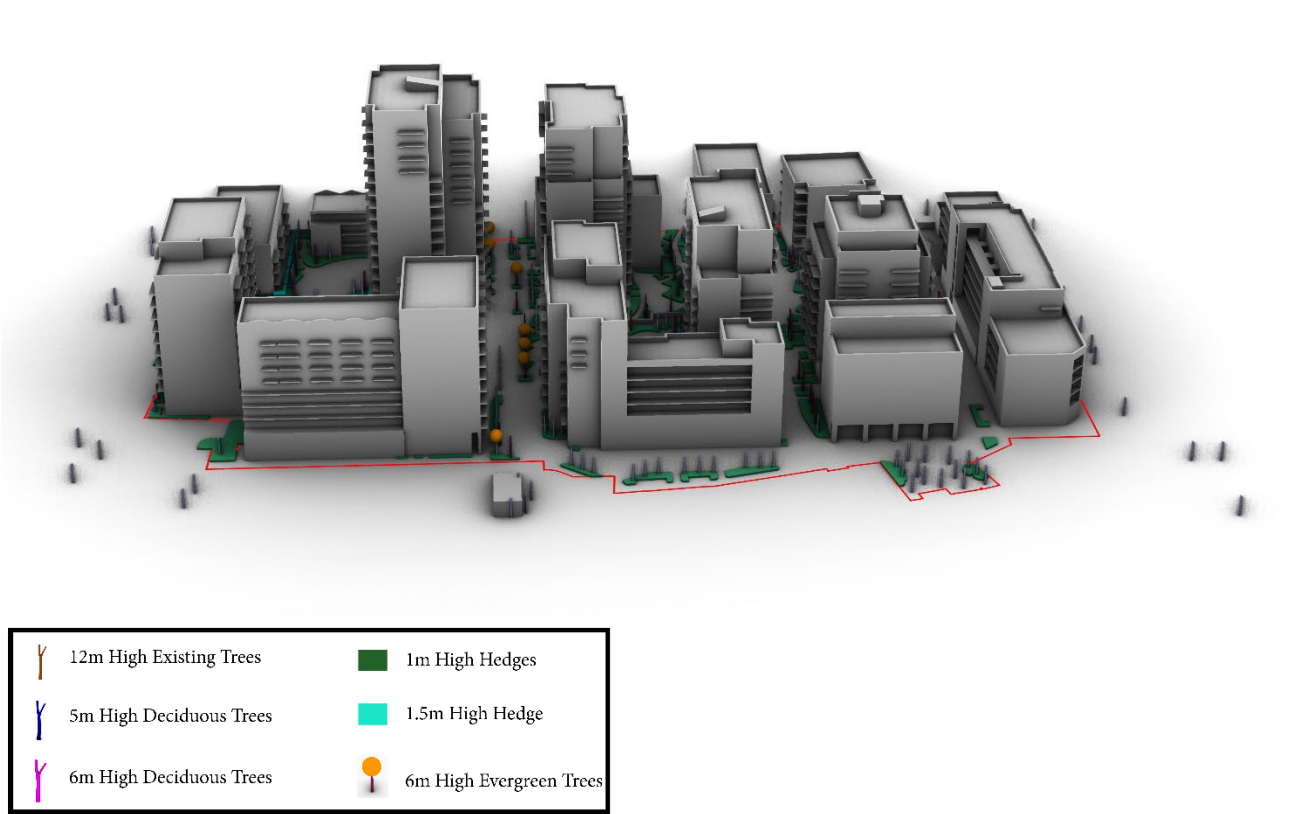
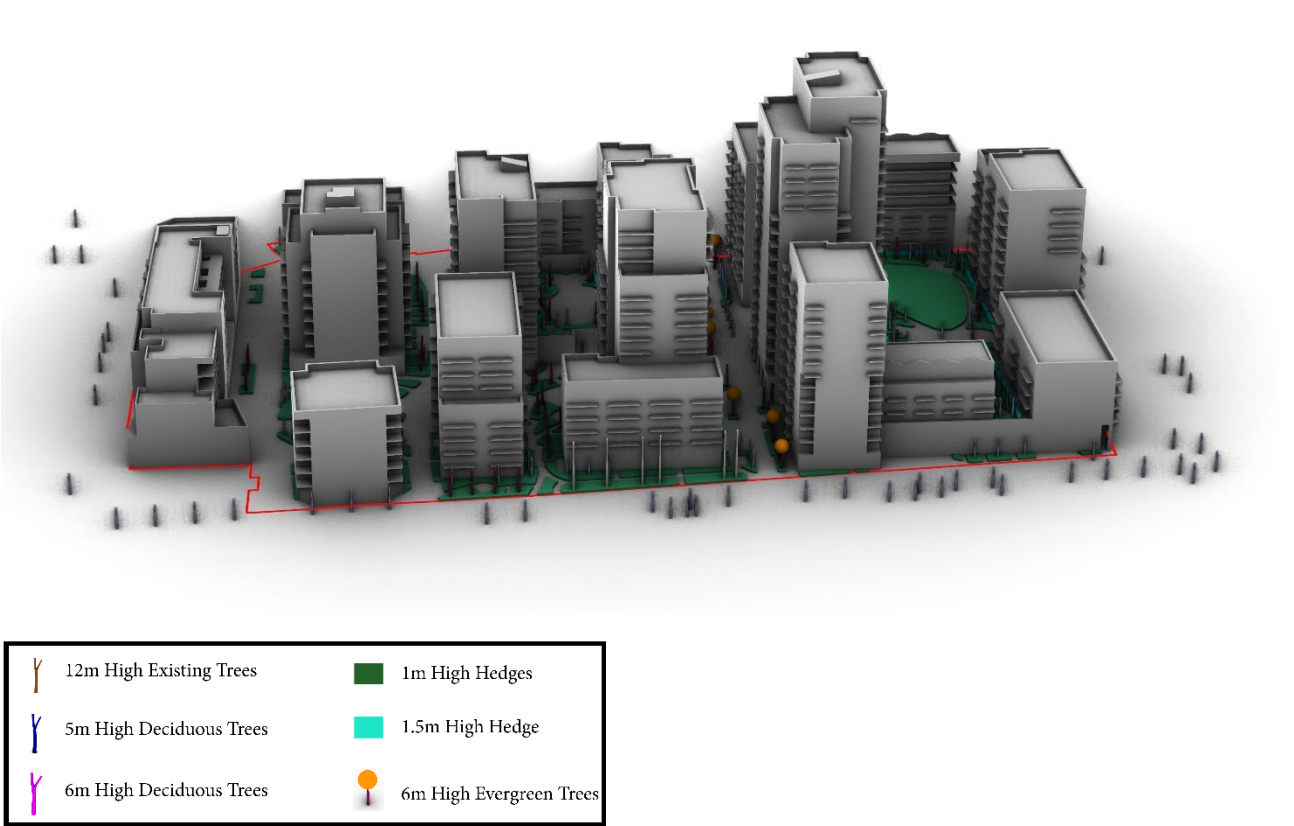


Figure 11.52 Mitigation Measures Tested – 3D South Aspect



MITIGATION, MONITORING AND RESIDUAL EFFECTS

Demolition and Construction Mitigation

- 11.118 It is assumed that there will be restricted access (i.e., not accessible to the general public) to the site during demolition and construction.
- 11.119 It is expected that there would be appropriate health and safety measures implemented to ensure that the construction workers were adequately protected, and public access would be restricted (i.e., hoarding around the site).
- 11.120 No additional wind mitigation measures would therefore be required specifically for the demolition and construction phase.

Phased Development Mitigation

- 11.121 Based on the currently tested configurations and mitigation measures included, there remain some areas of adverse wind safety and comfort conditions on-site. As such, additional on-site mitigation measures have been coordinated with the design team to provide suitable design where wind conditions in the remaining locations which are unsuitable for the intended use. These additional mitigation measures are presented in Table 11.7 and Figure 11.53 to Figure 11.64.
- 11.122 For locations 20, 88, 89, 90, 92, 93, 98 and 117 (podium/terraces) is it proposed that the proposed landscaping will suitably mitigate these adverse wind comfort conditions during the summer season due to the planting being treated as deciduous in the current testing. During the summer season, the addition of foliage will provide sufficient additional shelter to maintain comfort conditions.
- 11.123 It is anticipated by the inclusion of these additional mitigation measures into the final design, all areas of the development will be safe and fit for intended usage.
- 11.124 It is recommended the efficacy of these measures is test prior to occupation with further wind tunnel or CFD testing.

Table 11.7 Proposed Mitigation – Configuration 2: Interim Phase of the Proposed Development

Probe Number	Exceedance	Potential/Proposed Mitigation Measure
91	Safety and Summer Exceedance	Temporary 2m Side Screen (Phased Development Only)
94	Summer Exceedance	1.5m High Balustrades
95	Summer Exceedance	1.5m High Balustrades
96	Summer Exceedance	1.5m High Balustrades
97	Summer Exceedance	1.5m High Balustrades
99	Summer Exceedance	1.5m High Balustrades
100	Summer Exceedance	1.5m High Balustrades
101	Summer Exceedance	1.5m High Balustrades
102	Summer Exceedance	1.5m High Balustrades
103	Summer Exceedance	1.5m High Balustrades
104	Summer Exceedance	1.5m High Balustrades
105	Summer Exceedance	1.5m High Balustrades
106	Summer Exceedance	1.5m High Balustrades
107	Summer Exceedance	1.5m High Balustrades
108	Summer Exceedance	1.5m High Balustrades
110	Summer Exceedance	1.5m High Balustrades
111	Summer Exceedance	1.5m High Balustrades

Probe Number	Exceedance	Potential/Proposed Mitigation Measure
112	Summer Exceedance	1.5m High Balustrades
114	Summer Exceedance	1.5m High Balustrades
146	Summer Exceedance	1.5m High Balustrades
147	Summer and Safety Exceedance	1.8m High Side Screen
148	Summer Exceedance	1.5m High Balustrades
149	Summer Exceedance	1.5m High Balustrades
150	Summer Exceedance	1.5m High Balustrades

Figure 11.53 Additional Mitigation Phasing – Plan View Safety



Figure 11.54 Additional Mitigation Phasing – Plan View Comfort



Figure 11.55 Additional Mitigation Phasing – 3D West Aspect – Comfort

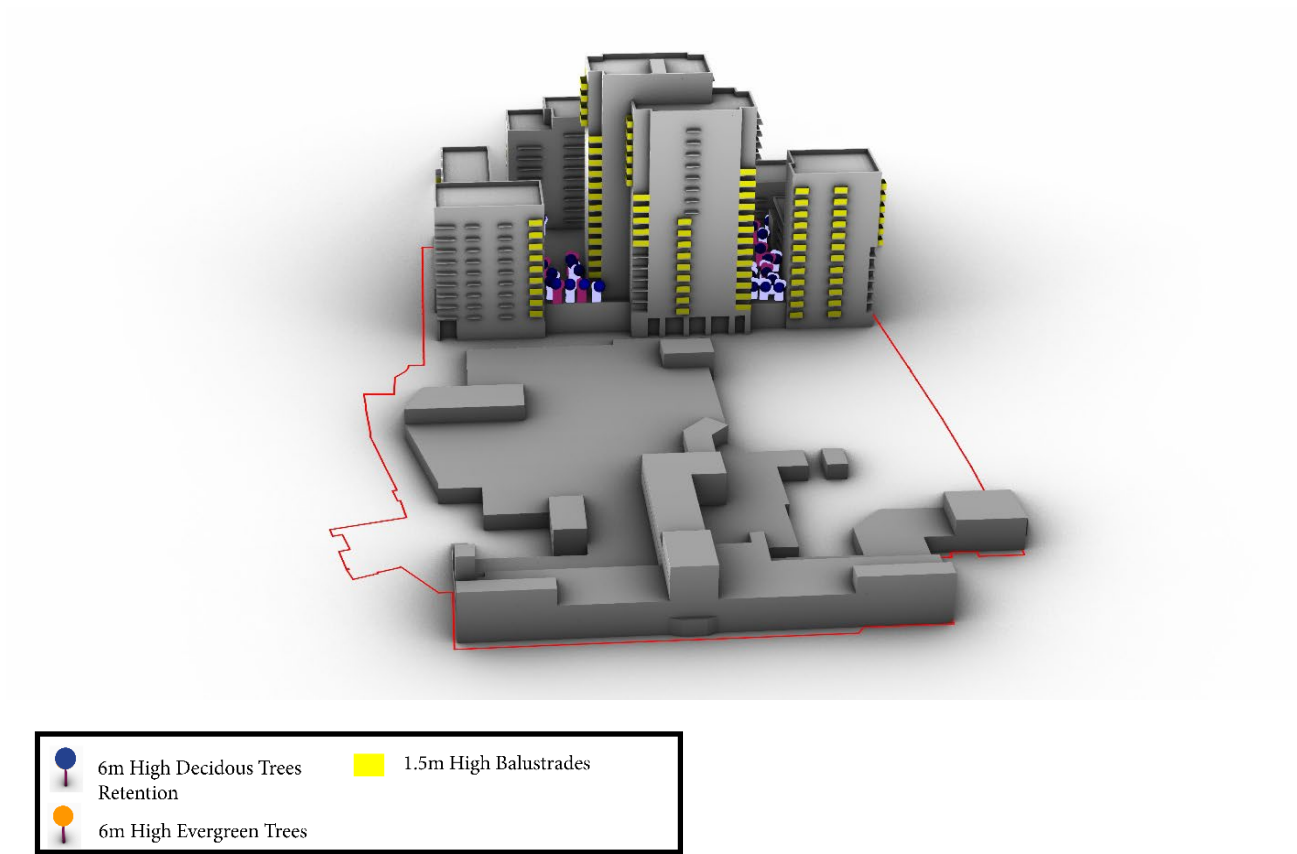


Figure 11.56 Additional Mitigation Phasing – 3D East Aspect- Comfort

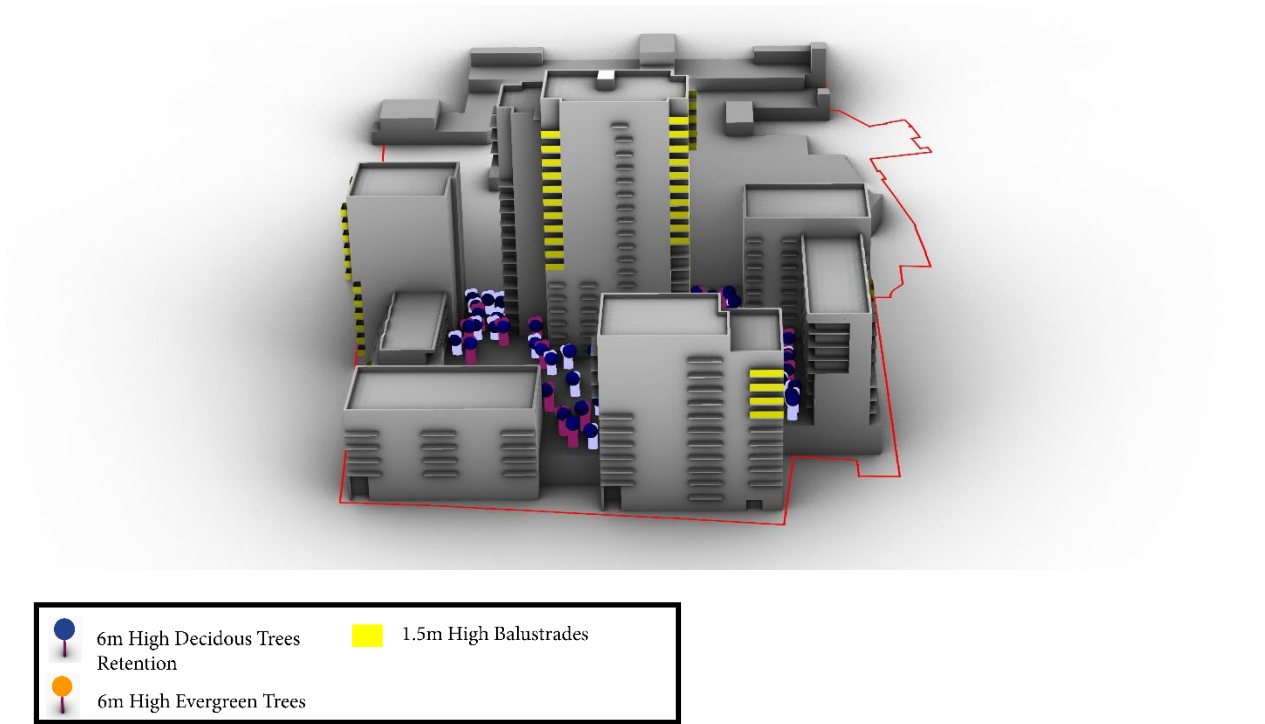


Figure 11.57 Additional Mitigation Phasing – 3D North Aspect- Comfort

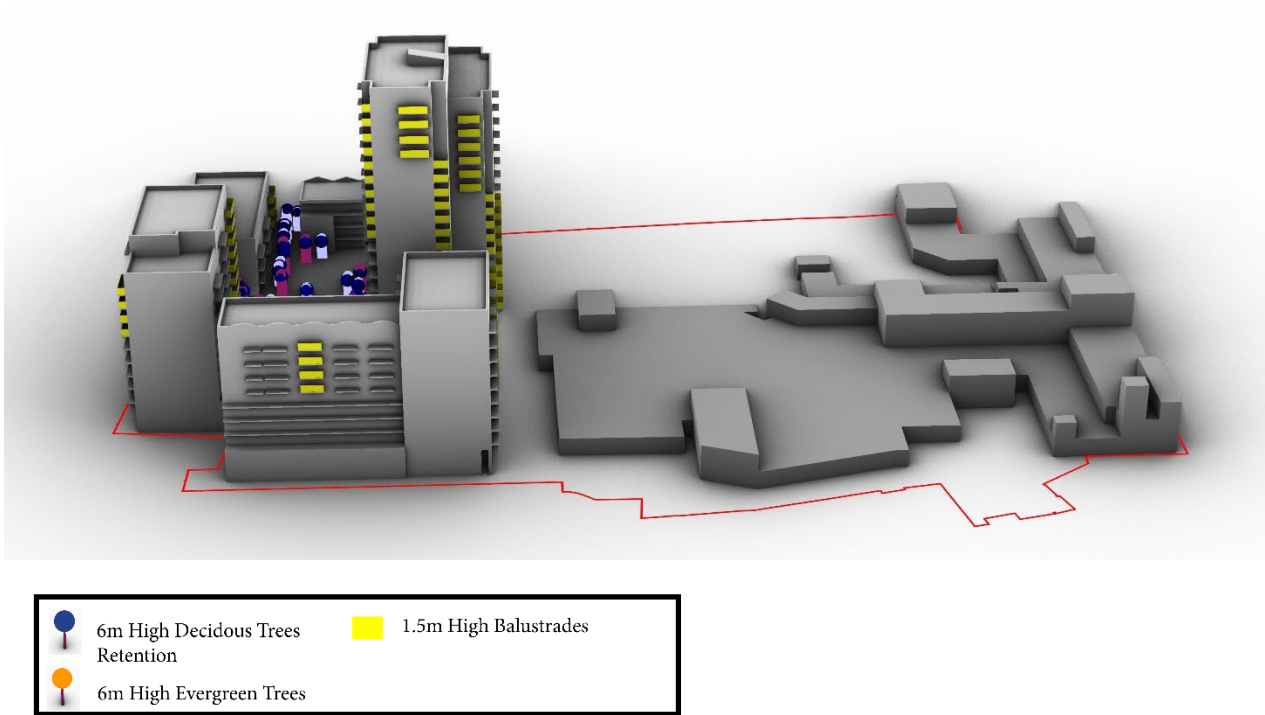
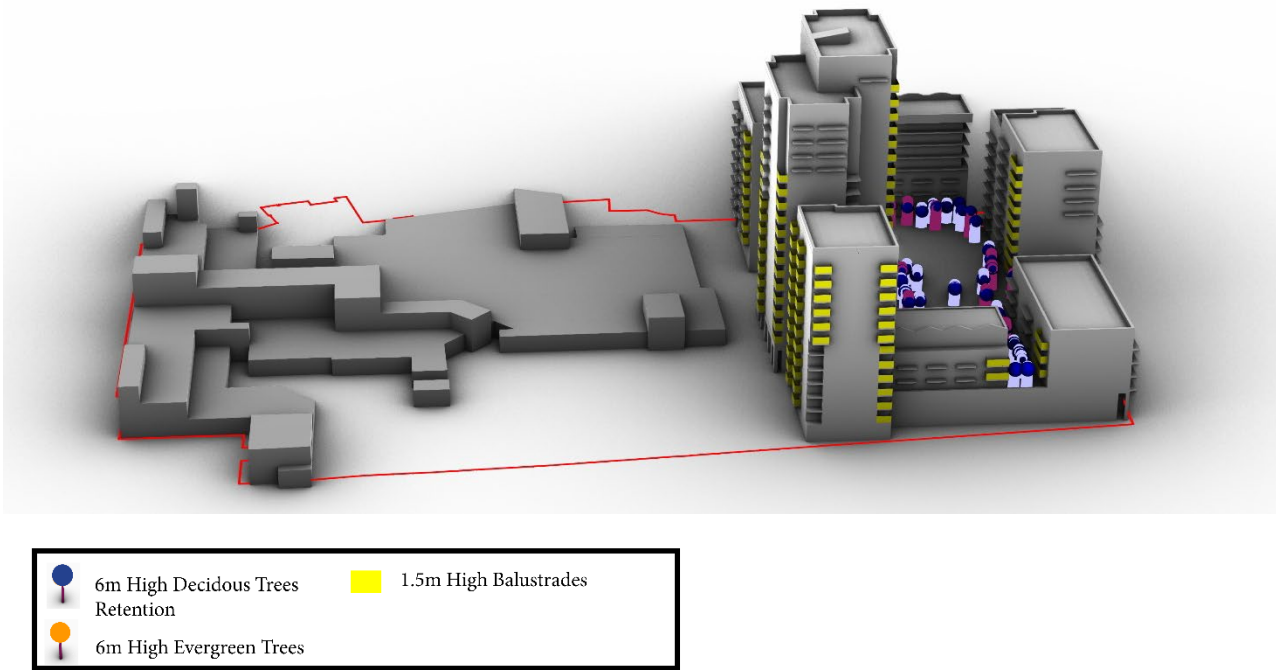


Figure 11.58 Additional Mitigation Phasing – 3D South Aspect- Comfort



Completed Development Mitigation

- 11.125** Based on the currently tested configurations and mitigation measures included, there remain some areas of adverse wind safety and comfort conditions on-site. As such, additional on-site mitigation measures have been coordinated with the design team to provide suitable design where wind conditions in the remaining locations which are unsuitable for the intended use. These additional mitigation measures are presented **Error! Reference source not found.** to Figure 11.64.
- 11.126** For locations P4, P5, P67, P69, P84, 86, 87, 89, 90, 91, 98 and 117 (ground floor amenity space/podium/terraces) is it proposed that the current landscaping will suitably mitigate these adverse wind comfort conditions during the summer season due to the planting being treated as deciduous in the current testing. During the summer season, the addition of foliage will provide sufficient additional shelter to maintain comfort conditions.
- 11.127** It is anticipated by the inclusion of these additional mitigation measures into the final design, all areas of the development will be safe and fit for intended usage.
- 11.128** It is recommended the efficacy of these measures is test prior to occupation with further wind tunnel or CFD testing.

Table 11.8 Proposed Mitigation – Configuration 4: Completed Proposed Development with Existing Surrounds and Proposed Landscaping

Probe Number	Exceedance	Mitigation Measure
20	Summer Exceedance	2.4m High Balustrade
94	Summer Exceedance	2m Side Screen
95	Summer Exceedance	1.5m High Balustrades
96	Summer Exceedance	1.5m High Balustrades
97	Summer Exceedance	1.5m High Balustrades
99	Summer Exceedance	1.5m High Balustrades
100	Summer Exceedance	1.5m High Balustrades

Probe Number	Exceedance	Mitigation Measure
101	Summer Exceedance	1.5m High Balustrades
102	Summer and Safety Exceedance	1.1m High Balustrades
103	Summer Exceedance	1.5m High Balustrades
104	Summer Exceedance	1.5m High Balustrades
105	Summer Exceedance	1.5m High Balustrades
106	Summer Exceedance	1.5m High Balustrades
107	Summer Exceedance	1.5m High Balustrades
108	Summer Exceedance	1.5m High Balustrades
110	Summer Exceedance	1.5m High Balustrades
111	Summer Exceedance	1.5m High Balustrades
112	Summer Exceedance	1.5m High Balustrades
113	Summer Exceedance	1.5m High Balustrades
114	Summer Exceedance	1.5m High Balustrades
115	Summer Exceedance	1.5m High Balustrades
116	Summer Exceedance	1.5m High Balustrades
119	Summer Exceedance	1.5m High Balustrades
120	Summer Exceedance	1.5m High Balustrades
122	Summer Exceedance	1.5m High Balustrades
123	Summer Exceedance	1.5m High Balustrades
127	Summer Exceedance	1.5m High Balustrades
128	Summer Exceedance	1.5m High Balustrades
129	Summer Exceedance	1.5m High Balustrades
130	Summer Exceedance	1.5m High Balustrades
131	Summer Exceedance	1.5m High Balustrades
132	Summer Exceedance	1.5m High Balustrades
134	Summer Exceedance	1.5m High Balustrades
135	Summer Exceedance	1.5m High Balustrades
137	Summer Exceedance	1.5m High Balustrades
138	Summer Exceedance	1.5m High Balustrades
139	Summer Exceedance	1.5m High Balustrades
141	Summer Exceedance	1.5m High Balustrades
143	Summer and Safety Exceedance	1.1m High Balustrades
146	Summer Exceedance	1.5m High Balustrades
147	Summer Exceedance	1.5m High Balustrades
148	Summer Exceedance	1.5m High Balustrades
149	Summer Exceedance	1.5m High Balustrades
150	Summer Exceedance	1.5m High Balustrades

11.129 The two safety concerns at P102 and P120 require a 1.1m high balustrade mitigation. This has been discussed with the design team and will form part of the end design (with the balcony at location P102 already designed with a 1.1m balustrade). While not tested it is the professional opinion of the wind engineer that this will provide safe wind conditions and therefore reduce effects to Negligible (not significant).

Figure 11.59 Additional Mitigation – Plan View Safety



Figure 11.60 Additional Mitigation – Plan View Comfort



Figure 11.61 Additional Mitigation – 3D West Aspect - Comfort

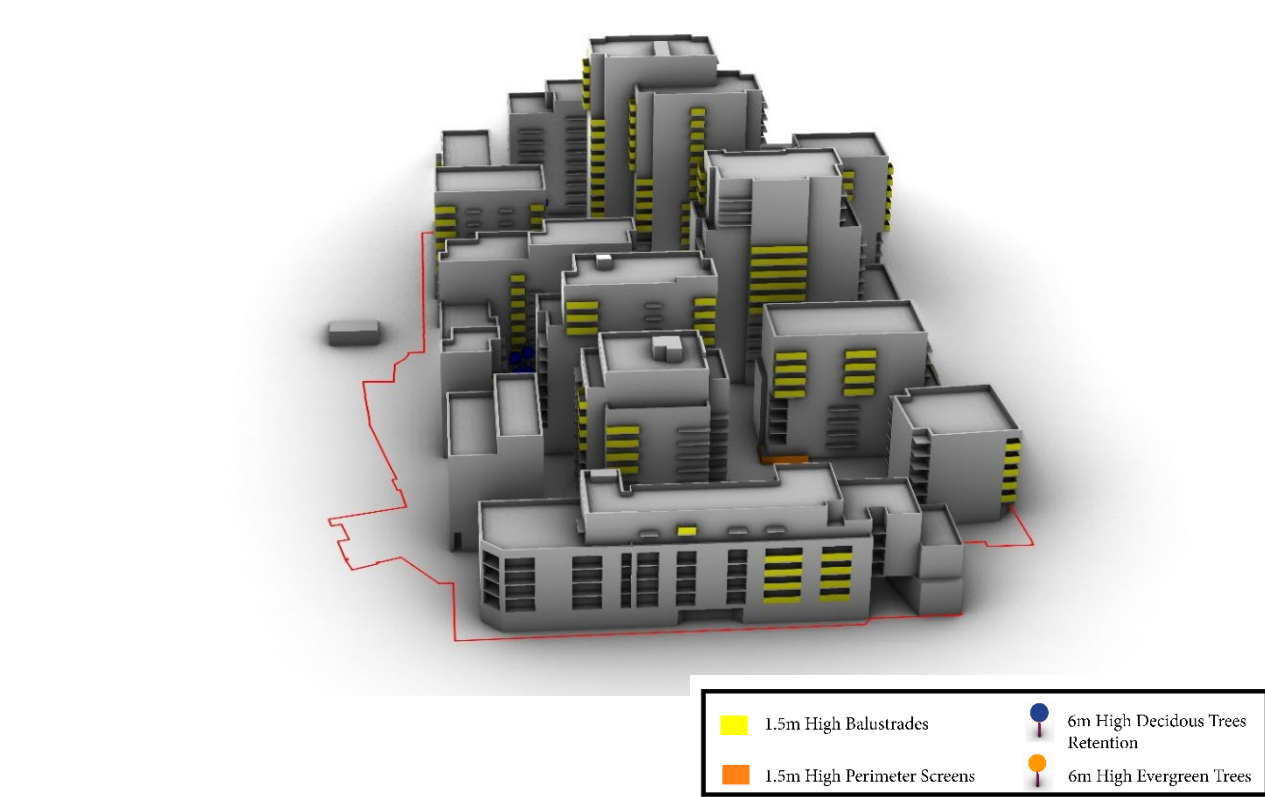


Figure 11.62 Additional Mitigation – 3D East Aspect- Comfort

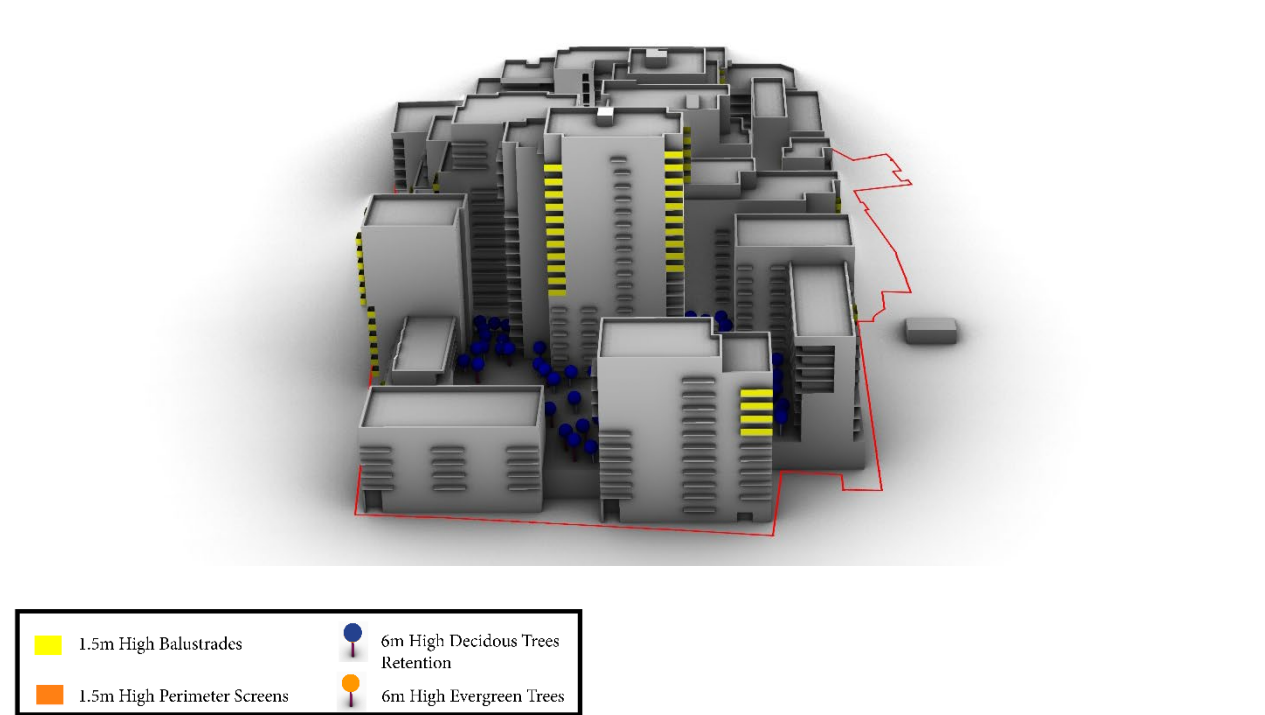


Figure 11.63 Additional Mitigation – 3D North Aspect- Comfort

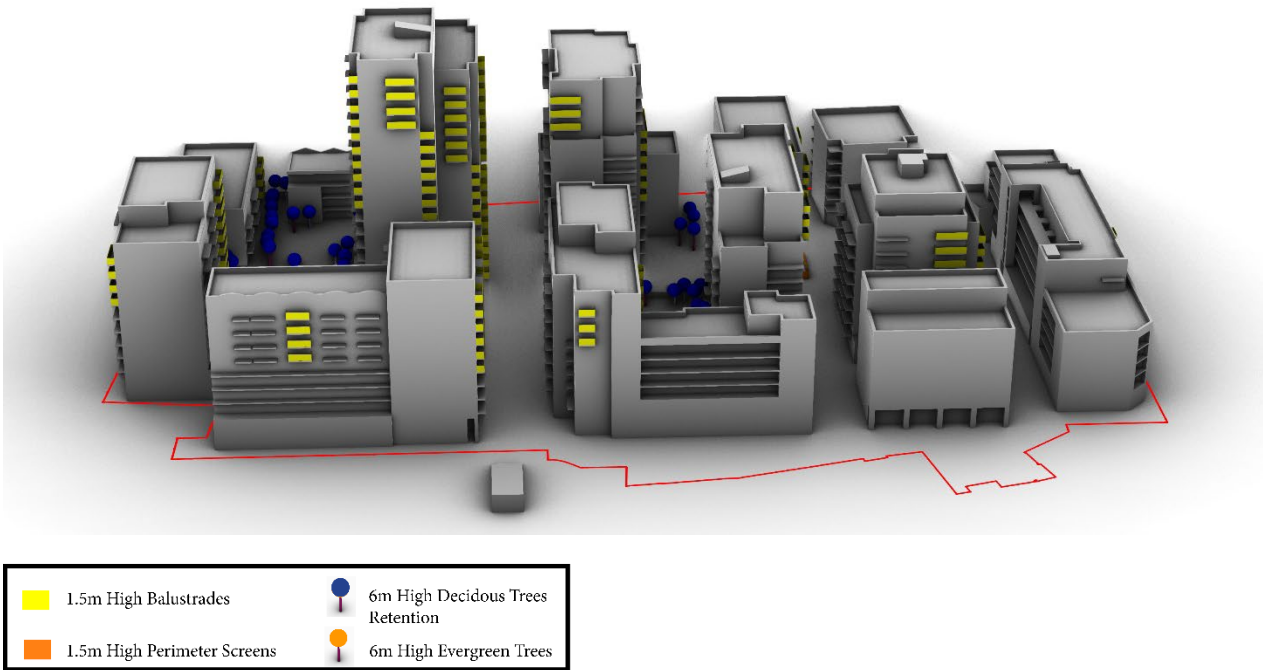
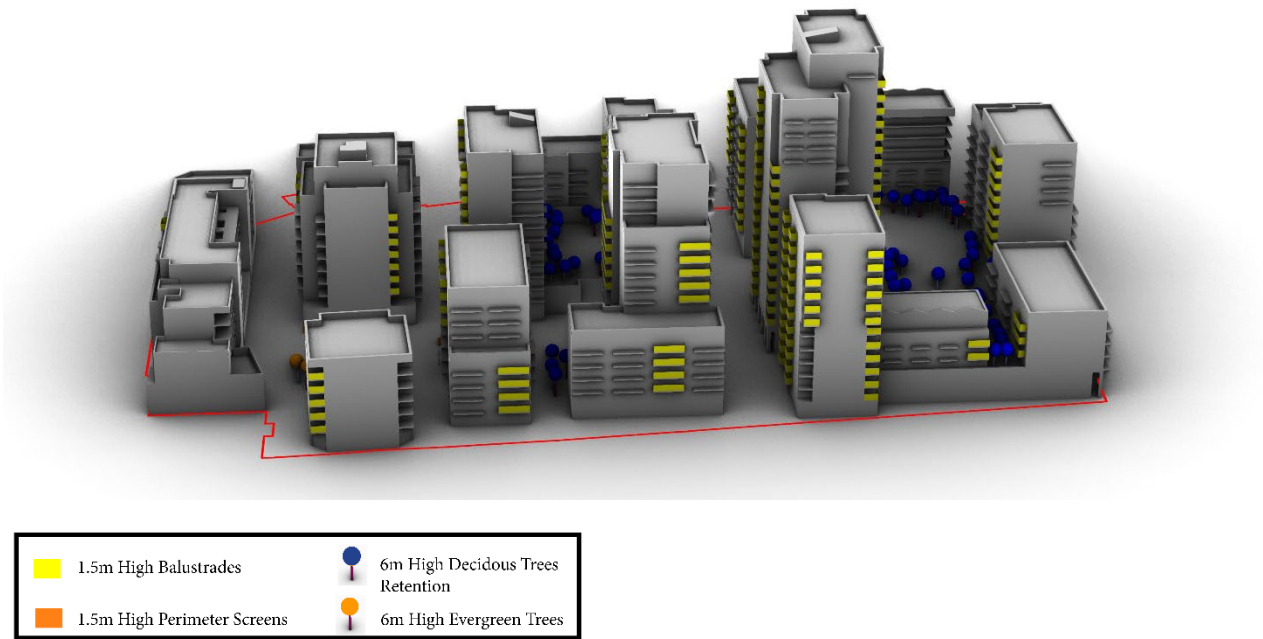


Figure 11.64 Additional Mitigation – 3D South Aspect- Comfort



Residual Effects

11.130 All of the residual effects resulting from the Proposed Development, are presented in Table 11.8, identifying whether the effect is significant or not.

Table 11.9 Residual Effects on Comfort and Safety

Receptor	Description of the Residual Effect	Scale and Nature	Significant / Not Significant	Geo	D I	P T	St Mt Lt
Demolition and Construction							
All Receptors	N/A	Negligible	Not Significant	L	D	P	Lt
Phased Development							
Thoroughfares (Windiest Season)	Wind conditions on thoroughfares	Negligible (P3, P9, P18, P33, P42, P70, P76 and P82)	Not Significant	L	D	T	St
		Moderate Beneficial (P6)	Not Significant	L	D	T	St
Bus Stops (Windiest Season)	Wind conditions at bus stops surrounding the site	Negligible (P1, P15, P21 and P37)	Not Significant	L	D	T	St
		Major Adverse (P32)	Significant	L	D	T	St
Pedestrian Crossings (Windiest Season)	Wind conditions at pedestrian crossings surrounding the site	Negligible (P7 and P8)	Not Significant	L	D	T	St
Roads (Windiest Season)	Wind conditions at roads surrounding the site	Negligible (P25 and P30)	Not Significant	L	D	T	St
Entrances (Windiest Season)	Wind conditions at entrances of Phase 1 of the Proposed Development	Negligible (P2, P11, P13, P26, P28, P29, P31, P35, P38, P43, P54, P56, P72, P79 and P80)	Not Significant	L	D	T	St
		Moderate Beneficial (P12, P16, P19, P23 and P24)	Not Significant	L	D	T	St
Seating/Play Areas/Outdoor Amenity Space (Summer Season)	Wind conditions at ground level seating / play areas / outdoor amenity spaces	Moderate Beneficial (P27)	Not Significant	L	D	T	St
Podium and Terraces (Summer Season)	Wind conditions at podium / terrace locations of Phase 1 of the Proposed Development	Moderate Adverse (P20, P87, P88, P89, P90, P91, P92, P93, P98 and P117)	Significant	L	D	T	St
Balconies (Summer Season)	Wind conditions on balconies of Phase 1 of the Proposed Development	Negligible (P145)	Not Significant	L	D	T	St
		Moderate Adverse (P94, P95, P96, P97, P99, P100, P101, P102, P103, P104, P105, P106, P107, P108, P110, P111, P112,	Significant	L	D	T	St

Receptor	Description of the Residual Effect	Scale and Nature	Significant / Not Significant	Geo	D I	P T	St Mt Lt
		P114, P146, P147, P148, P149, P150)					
Completed Development							
Thoroughfares (Windiest Season)	Wind conditions on thoroughfares	Moderate Adverse (P6)	Not Significant	L	D	P	Lt
		Negligible (P3, P9, P10, P17, P18, P33, P61, P70, P77 and P82)	Not Significant	L	D	P	Lt
		Moderate Beneficial (P42, P75 and P76,	Not Significant	L	D	P	Lt
Bus Stops (Windiest Season)	Wind conditions at bus stops surrounding the site	Negligible (P1, P15, P21, P32 and P37)	Not Significant	L	D	P	Lt
Pedestrian Crossings (Windiest Season)	Wind conditions at pedestrian crossings surrounding the site	Negligible (P7 and P8)	Not Significant	L	D	P	Lt
Roads (Windiest Season)	Wind conditions at roads surrounding the site	Negligible (P25 and P30)	Not Significant	L	D	P	Lt
Entrances (Windiest Season)	Wind conditions at entrances of the Proposed Development and surrounding the site	Negligible (P2, P11, P13, P16, P22, P23, P26, P28, P43, P45, P47, P51, P56, P59, P63, P64 and P72)	Not Significant	L	D	P	Lt
		Moderate Beneficial (P14, P19, P29, P31, P35, P41, P54, P65, P79 and P80)	Not Significant	L	D	P	Lt
		Moderate Adverse (P12 and P24)	Not Significant	L	D	P	Lt
		Moderate Adverse (P53)	Significant	L	D	P	Lt
		Major Adverse (P38)	Significant	L	D	P	Lt
Seating/Play Areas/Outdoor Amenity Space (Summer Season)	Wind conditions at ground level seating / play areas / outdoor amenity spaces	Negligible (P52, P60, P68 and P71)	Not Significant	L	D	P	Lt
		Moderate Beneficial (P27, P34, P36, P39, P44, P46, P50, P55, P62, P73, P74, P78 and P81)	Not Significant	L	D	P	Lt
		Moderate Adverse (P48, P49, P57, P58, P66, P97 and P69)	Significant	L	D	P	Lt

Receptor	Description of the Residual Effect	Scale and Nature	Significant / Not Significant	Geo	D I	P T	St Mt Lt
Podium and Terraces (Summer Season)	Wind conditions at podium / terrace locations of the Proposed Development	Negligible (P83, P84, P85, P86, P88, P89, P90, P92, P93, P118 and P128)	Not Significant	L	D	P	Lt
		Moderate Adverse (P4, P5, P20, P84, P86, P87, P89, P90, P91, P98 and P117)	Significant	L	D	P	Lt
Balconies (Summer Season)	Wind conditions on balconies of the Proposed Development	Negligilbe (P102, P111, P114, P121, P124, P125, P126, P133, P136, P140, P142, P143, P144, P145 and P147)	Not Significant	L	D	P	Lt
		Moderate Adverse (P94, P95, P95, P97, P99, P100, P101, P102 P103, P104, P105, P106, P107, P108, P110, P112, P113, P115, P116, P119, P120, P122, P123, P125, P127, P129, P130, P131, P132, P134, P135, P137, P138, P139, P141, P146, P148, P149 and P150)	Significant	L	D	P	Lt
Notes: Residual Effect - Scale = Negligible / Moderate / Major - Nature = Beneficial or Adverse Geo (Geographic Extent) = Local (L), Borough (B), Regional (R), National (N) D = Direct / I = Indirect P = Permanent / T = Temporary St = Short Term / Mt = Medium Term / Lt = Long Term N/A = not applicable / not assessed							

ASSESSMENT OF THE FUTURE ENVIRONMENT

Evolution of the Baseline Scenario

11.131 The evolved baseline is a baseline condition at an indeterminate point in the future, for a scenario which assumes all of the cumulative schemes are built in the surrounding environment and that the surrounding environment, including the site, has naturally evolved in the absence of the Proposed Development being

implemented. Following a review of the cumulative schemes (as detailed in **ES Volume 1, Chapter 2: EIA Methodology**) there are no cumulative schemes identified within the 500m radius from the centre of the site that would result in changes to the baseline. Therefore the evolved baseline has not been considered further.

Cumulative Effects Assessment

- 11.132** Cumulative schemes within the surrounds that are already under construction have been considered as existing surrounding buildings.
- 11.133** There have been no cumulative schemes identified within the 400m radius from the centre of the site that would necessitate a cumulative assessment.

LIKELY SIGNIFICANT EFFECTS

- 11.134** Based on the currently tested configurations and mitigation measures included, there remain some areas of adverse wind safety and comfort conditions on-site. As such, additional on-site mitigation measures have been coordinated with the design team to provide suitable design where wind conditions in the remaining locations which are unsuitable for the intended use. Below is a list of the remaining significant effects.
- 11.135** For locations P4, P5, P67, P69, P84, 86, 87, 89, 90, 91, 98 and 117 (ground floor amenity spaces /podium/terraces) it is proposed that the current landscaping will suitably mitigate these adverse wind comfort conditions during the summer season due to the planting being treated as deciduous in the current testing. During the summer season, the addition of foliage will provide sufficient additional shelter to maintain comfort conditions.
- 11.136** For locations P48, P49, P57, P58 and P66 (ground-level seating) mitigation has been discussed with the design team and will form part of the end design, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.
- 11.137** For locations P94, P95, P96, P97, P99, P100, P101, P102, P103, P104, P105, P106, P107, P108, P110, P112, P113, P115, P116, P119, P120, P122, P123, P125, P127, P129, P130, P131, P132, P134, P135, P137, P138, P139, P141, P143, P146, P148 and P149 and P150 (Balconies) mitigation has been discussed with the design team and will form part of the end design, as discussed in the 'Mitigation, Monitoring and Residual Effects' section.
- 11.138** It is anticipated by the inclusion of these additional mitigation measures into the final design, all areas of the development will be safe and fit for intended usage.
- 11.139** It is recommended the efficacy of these measures is tested prior to occupation with further wind tunnel or CFD testing.