

# THE GOODSYARD

Environmental Statement Addendum Volume 2

September 2019 – Chapter 10 of 21

ballymore.



Hammerson

# CHAPTER 10: WIND MICROCLIMATE

10.1 INTRODUCTION	
10.1.1	This chapter reviews the potential impacts of the Revised Scheme with respect to wind microclimate.
10.1.2	The policy applicable to the assessment is unchanged from the 2015 Proposed Development however certain updates to local and regional policy have been incorporated within this ES Addendum chapter.
10.1.3	The baseline for the Revised Scheme has been updated to reflect the existing conditions at the site (May 2019). The assessment has been revised to assess the changes in the massing of the buildings for the Revised Scheme.
10.1.4	The cumulative assessment has also been updated to reflect the revised list of cumulative developments as outlined in <b>Chapter 3: Methodology, Table 3.9</b> .
10.1.5	Due to the changes in massing of the buildings in the Revised Scheme, it is likely that there are changes to the wind conditions resulting from the Revised Scheme compared to the 2015 Proposed Development.

10.2 SCOPE OF ASSESSMENT	
10.2.1	This chapter of the ES Addendum assesses the likely significant effects of the Revised Scheme in terms of Wind Microclimate and is supported by <b>ES Addendum Volume 4 Appendix F: Wind Microclimate</b> .
10.2.2	The chapter describes: the assessment methodology; the baseline conditions currently existing at the site and in the surrounding area; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects associated with the Revised Scheme in combination with other developments within 360 m of the site.
10.2.3	Type 1 cumulative effects ‘intra-project effects’ which are the combined effects of individual topic impacts on a particular sensitive receptor are considered in <b>Chapter 20: Effect Interactions</b> .

10.3 KEY LEGISLATION, POLICY AND GUIDANCE CONSIDERATIONS	
10.3.1	<p>The wind microclimate assessment has been undertaken within the context of relevant planning policies, guidance documents and legislative instruments. These are summarised below.</p> <p><b>Legislation and Regulation</b></p> <p>10.3.2 There is no national, regional or local legislation or regulation relating to the pedestrian level wind microclimate impact of a development.</p> <p><b>Planning Policy</b></p> <p><b>National Policy</b></p> <p><i>National Planning Policy Framework<sup>1</sup> (NPPF)</i></p> <p>10.3.3 In February 2019, the Government published an updated version of the NPPF. There are no policies pertaining to wind microclimate in the NPPF.</p> <p><b>Regional Policy</b></p> <p><i>Draft London Plan<sup>2</sup></i></p> <p>10.3.4 The Draft New London Plan (2018) updates and consolidates the existing plan to provide guidance for development and</p>

<sup>1</sup> Department for Communities and Local Government, 2019. Revised National Planning Policy Framework. London. HMSO.

<sup>2</sup> Greater London Authority, 2018. Draft London Plan. London. GLA.

	a policy framework for local plans across London.
	<ul style="list-style-type: none"><li>• <i>Policy D8 Tall Buildings</i><ul style="list-style-type: none"><li>○ “Environmental impact<ul style="list-style-type: none"><li>▪ Wind [...] around the building and neighbourhood must be carefully considered and not compromise comfort and the enjoyment of open spaces</li><li>▪ Air movement affected by the building should [...] not adversely affect street level conditions.”</li></ul></li></ul></li><li>• <i>Policy D7: Public realm</i><ul style="list-style-type: none"><li>○ “Development Plans and development proposals should: [...] Consideration should be given to the local microclimate created by buildings.”</li></ul></li></ul>
	<i>The London Plan<sup>3</sup></i>
10.3.5	<p>The London Plan (2016) places great importance on the creation and maintenance of high quality environment for London. The following policies apply specifically in relation to wind microclimate:</p> <ul style="list-style-type: none"><li>• <i>Policy 7.6 Architecture</i><ul style="list-style-type: none"><li>○ “Architecture should make a positive contribution to a coherent public realm, streetscape and wider cityscape. It should incorporate the highest quality materials and design appropriate to its context.”</li><li>○ “Buildings and structures should: [...] not cause unacceptable harm to the amenity of surrounding land and buildings, particularly residential buildings, in relation to privacy, overshadowing, wind and microclimate. This is particularly important for tall buildings.”</li></ul></li><li>• <i>Policy 7.7 Location and Design of Tall and Large Buildings</i><ul style="list-style-type: none"><li>○ “Tall and large buildings should be part of a plan-led approach to changing or developing an area by the identification of appropriate, sensitive and inappropriate locations. Tall and large buildings should not have an unacceptably harmful impact on their surroundings.”</li><li>○ “Applications for tall or large buildings should include an urban design analysis that demonstrates the proposal is part of a strategy that will meet the criteria below. This particularly important if the site is not identified as a location for tall or large buildings in the borough’s LDF.”</li><li>○ “Tall buildings: [...] should not affect their surroundings adversely in terms of microclimate, wind turbulence, overshadowing, noise, reflected glare, aviation and telecommunication interference.”</li></ul></li></ul>
	<b>Local Planning Policy</b>
	<i>Tower Hamlets Draft Local Plan 2031<sup>4</sup></i>
10.3.6	<p>Policy D.DH6: Tall buildings states that:</p> <ul style="list-style-type: none"><li>• “Development with tall buildings are required to [...] demonstrate that the development does not adversely impact on the microclimate and amenity of the proposal site and the surrounding area”.</li></ul>
10.3.7	<p>Section 3.61 states that:</p> <ul style="list-style-type: none"><li>• “Tall buildings can significantly impact the quality and safety of the public realm (for example, [...] through generating adverse micro-climatic conditions, such as wind funnelling). They may cause [...] undermine the quality and value of adjacent developments. In low-or-medium rise residential neighbourhoods, tall buildings [...] have a negative impact on amenity and views.”</li></ul>
10.3.8	<p>Section 3.66 states that:</p> <ul style="list-style-type: none"><li>• “Proposals involving tall buildings will need to demonstrate how any adverse impacts on the microclimate will be mitigated in relation to wind [...] Buildings over 30 metres in height and/or substantially taller than the surrounding area and/or over 150 units must be tested against the industry standard Lawson criteria in relation to wind. The testing of the following scenarios will be required as part of the planning application.<ul style="list-style-type: none"><li>○ Baseline (i.e. the situation at the time of submission).</li><li>○ The proposed development without mitigation/landscaping.</li><li>○ The development with surrounding cumulative developments without mitigation/landscaping.</li><li>○ The development with the inclusion of mitigation/landscaping.</li><li>○ The development with surrounding cumulative developments with the inclusion of mitigation/landscaping.</li><li>○ Specific details on the required mitigation measures must be provided, including where and how these measures will be implemented.</li></ul></li></ul>

<sup>3</sup> Greater London Authority, 2016. London Plan – The Spatial Development Strategy for London Consolidated with Alterations since 2011. London. GLA.

<sup>4</sup> London Borough of Tower Hamlets, 2017. Tower Hamlets Draft Local Plan 2031. London. LBTH.

- *It is essential that any required mitigation measures are tested as part of the application. This is to ensure that the mitigation is adequate, and can therefore be relied upon. The mitigation must be implemented prior to occupation of any part of the development and retained for the duration of the development.”*

*Building heights note Version 2*<sup>5</sup>

10.3.9 Section 5.3.1 Building Height – The big picture states that:

- *“Tall buildings have a positive role to play in signifying locations [...] this has to be weighed against the possible negative impacts on microclimate (such as wind funnels [...]), environmental performance of nearby buildings”.*

*Hackney Draft Local Plan 2033*<sup>6</sup>

10.3.10 Protecting and Enhancing Heritage and Leading the Way in Good Urban Design states that:

- *“Amenity can be compromised in a number of ways through development, such as [...] causing detrimental micro-climate effects”.*

*Hackney Development Management Local Plan*<sup>7</sup>

10.3.11 Managing the Impact of Development and Amenity states that:

- *“Amenity can be compromised in a number of ways through development, such as [...] causing detrimental micro-climate effects”.*  
*“Large developments in particular can alter a local climate. [...] Buildings can also affect the flow of air and cause wind tunnels and downdraughts. All developments should consider local topography and the local microclimate in their design, and proposals must demonstrate they have addressed the potential impact on local conditions.”*

**Technical Standards and Guidance**

National Planning Practice Guidance<sup>8</sup> (NPPG)

10.3.12 The NPPG was revised in July 2018 and provides a web-based resource in support of the NPPF.

10.3.13 The NPPG identifies the potential for a building's size and shape (particularly in the case of tall and large buildings) to affect the wind microclimate. Under the section addressing ‘Design: How should buildings and the spaces between them be considered?’, the NPPG states in Paragraph 025 (‘Consider form’) that:

- *“Some forms pose specific design challenges, for example how taller buildings meet the ground and how they affect local wind [...] patterns should be carefully considered.’ The NPPG goes on to state in Paragraph 026 (‘Consider scale’) that: ‘Account should be taken of local climatic condition, including [...] wind”.*

Sustainable Design and Construction Supplementary Planning Guidance (SPG)<sup>9</sup>

10.3.14 The SPG states in section 2.3.7 that:

- *“Large buildings have the ability to alter their local environment and affect the microclimate. For example, not only can particularly tall buildings cast a long shadow effecting buildings several streets away, they can influence how wind travels across a site, potentially making it unpleasant at ground level or limiting the potential to naturally ventilate buildings. One way to assess the impact of large buildings on the comfort of the street environment is the Lawson Comfort Criteria. This tool sets out a scale for assessing the suitability of wind conditions in the urban environment based upon threshold values of wind speeds and frequency of occurrence. It sets out a range of pedestrian activities from sitting through to crossing the road and for each activity defines a wind speed and frequency of occurrence. Where a proposed development is significantly taller than its surrounding environment, developers should carry out an assessment of its potential impact on the conditions at ground level, and ensure the resulting design of the development provides suitable conditions for the intended use.”*

<sup>5</sup> London Borough of Tower Hamlets, 2012. Local Development Framework: Building heights note Version 2. London. LBTH.

<sup>6</sup> London Borough of Hackney, 2018. Proposed Submission Local Plan 2033. London. LBH

<sup>7</sup> London Borough of Hackney, 2015. Development Management Local Plan. London. LBH

10.3.15 The SPG also advises using the Lawson Comfort Criteria to assess the impact of a large building on the comfort of the street environment, which sets out a scale for assessing the suitability of wind conditions in the urban environment.

**London Environment Strategy**<sup>10</sup>

10.3.16 The Mayor's London Environment Strategy was published on 31 May 2018 and sets out the Mayor's vision for London's environment to 2050. The London Environment Strategy includes a number of policies, aspirations, and guidance; however, nothing pertaining to wind microclimate.

## 10.4 CONSULTATION

10.4.1 In January 2014 a Scoping Opinion was issued jointly by the LBTH (Ref: PA/14/107) and LBH (Ref: 2014/0249) on the Proposed Development (see ES Addendum Volume 4 - Appendix A Scoping). A review of the Scoping Opinion was provided in April 2019. Table 10.1 outlines the comments received in the 2014 Scoping Opinion and the 2019 Scoping Opinion Review and where they have been addressed within the documentation.

Table 10.1 Scoping Opinion LBH / LBTH and the GLA 2014 Scoping Opinion Comments and Response

Topic / Section	Summary of Comment	Location within the ES Addendum where comments are addressed
Section 4, Wind Microclimate	Wind tunnel testing will be undertaken for the development (as the heights of the buildings are over 10 storeys) with the following scenarios modelled; existing baseline (to quantify existing conditions in and around the site); interim construction scenario (to take account of 12 year programme); completed development with existing surroundings; and completed development with cumulative schemes. The wind conditions will then be assessed using the Lawson Comfort Criteria.	10.5.19
Section 4, Wind Microclimate updated 2019	The assessment should include consideration of the impacts on the wider neighbouring area. Receptors should be identified for each measurement location, ensuring sensitive areas are assessed.	Table 10.5
Section 4, Wind Microclimate	Consideration should also be given to the wind climate to be experienced on balconies and roof terraces accessible by residents.	10.8.20 – 10.8.22, 10.8.38 – 10.8.40, 10.12.25 – 10.12.27
Section 4, Wind Microclimate	The significance of the impacts prior to mitigation should be stated within the chapter. Due to the size and complexity of the development, it is recommended that a final wind tunnel test be undertaken with the completed development and mitigation measures to ensure these are sufficient to achieve the necessary wind conditions both on and off site.	10.8.5
Section 4, Wind Microclimate	It would be useful if the surrounding receptors were shown on a figure, and the types of receptor (thoroughfare, balcony, entrance etc.) clearly differentiated on the supporting figures.	

<sup>8</sup> Department for Communities and Local Government, 2018. Planning Practice Guidance; <https://www.gov.uk/government/collections/planning-practice-guidance>

<sup>9</sup> Greater London Authority, 2014. Sustainable Design and Construction Supplementary Planning Guidance. London. GLA.

<sup>10</sup> Greater London Authority, 2018. London Environment Strategy. London. GLA.

Section 4, Wind Microclimate	The ES should identify the impacts both pre and post mitigation. Landscaping should only be included pre mitigation if the landscaping plans are to be approved.	10.8.5 – 10.8.7
Section 4, Wind Microclimate updated 2019	All data used to inform the wind microclimate assessment on the form of the development should be provided.	See Appendix F Technical Report

# 10.5 ASSESSMENT METHODOLOGY

## Determination of Baseline

### Current Baseline Conditions

10.5.11 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 measured (for both the windiest season (normally winter in the UK) to show the worst case scenario, and summer season for amenity spaces (amenity spaces are assessed during the summer season as these areas are expected to be used most frequently during this period with an expectation of calmer conditions compared to other times of the year) at locations across the existing site and at other surrounding buildings, paths, roads and areas of open spaces for 36 wind directions in 10° increments within an 360 m radius of the site (wind tunnel model 'Configuration 1: Existing site with Existing Surrounding Buildings') which is considered a large enough scale to ensure all wind effects are captured.

10.5.12 The results have been combined with long-term meteorological climate data for the London area gathered from them meteorological stations at three London airports (Gatwick, Heathrow and Stansted Airports). The meteorological data shown in **Figure 10.1** has been used in this assessment as this is deemed to be representative of the local wind climate for the London area.

### Likely Evolution of the Baseline

10.5.13 The evolution of the baseline conditions in the event that the Revised Scheme does not come forward has been considered using professional judgment informed by the wind tunnel results of the baseline and cumulative scenarios. The cumulative scenario provides information on the general changes, if any, in wind conditions around the site as a result of cumulative schemes. This, in combination with knowledge of how the Revised Scheme interacts with the wind flow by understanding the baseline wind conditions and how the Revised Scheme affects those localised conditions (assessed through Configuration 1 and 2) will be the basis of understanding the potential evolution of the baseline.

## Prediction Methodology

### Defining the Baseline

#### Demolition and Construction

10.5.14 The potential microclimate effects during the demolition and construction works have been 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 (due to protection from site hoarding, and site access being restricted to site workers) than when the Revised Scheme is completed and occupied (with public access and sensitive areas such as entrances and amenity space, for example).

10.5.15 A qualitative assessment of the wind microclimate during demolition / construction has therefore been undertaken and is based on professional judgement (informed by an assessment of the background wind microclimate in the area), the results of the tested configurations for the baseline and completed development scenarios, and RWDI's experience of assessing wind in the built environment.

#### Completed Development






10.5.16 To predict the local wind environment associated with the completed development, and the resulting pedestrian comfort within and immediately surrounding the site, wind tunnel testing of the Revised Scheme has been undertaken.

10.5.17 A comparison will be made to the baseline conditions and any existing safety exceedances if areas have become windier than desired at surrounding sensitive locations.

10.5.18 The 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 Addendum Volume 4 Appendix F: Wind Microclimate**.

- Step 1: The subject 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 is adjusted to account for conditions at a subject site (for this assessment, meteorological data has been derived from London meteorological stations (Gatwick, Heathrow and Stansted airports combined));
- 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. This is shown in **Table 10.2** below.

Table 10.2 Lawson Comfort Criteria

Colour	Comfort Category	Wind speed	Descriptor
	Uncomfortable	>10 m/s	Winds of this magnitude are considered a nuisance for most activities, and wind mitigation is typically recommended.
	Walking	8-10 m/s	Relatively high wind speeds that can be tolerated if the objective is to walk, run or cycle without lingering.
	Strolling	6-8 m/s	Moderate breezes that would be appropriate for strolling along a city/town centre street, plaza or park.
	Standing/entrances	4-6 m/s	Gentle breezes suitable for main building entrances, pick-up/drop-off points and bus stops.
	Sitting	0-4 m/s	Light breezes desired for outdoor restaurants and seating areas where one can read a paper or comfortably sit for long periods.

10.5.19 The assessment of the wind microclimate is based on the results from a series of wind tunnel model tests to provide a detailed, quantitative assessment. Four configurations have been tested within the wind tunnel, as set out below:

- Configuration 1: Existing site with the Existing Surrounding Buildings;
- Configuration 2: Revised Scheme Buildings 2 and 7 with, Landscaping, Wind Mitigation and the Existing Surrounding Buildings (mid construction scenario);
- Configuration 3: Revised Scheme with Landscaping, Wind Mitigation and the Existing Surrounding Buildings (Full Scheme); and
- Configuration 4: Revised Scheme with Landscaping, Wind Mitigation and the Cumulative Surrounding Buildings (Full Scheme with Cumulative)

10.5.20 The assessment was initially conducted devoid of landscaping in order to provide a worse-case (i.e. windy) scenario. Windy conditions and strong winds with the potential to be a safety concern for cyclists and pedestrians were identified which would require the development of wind mitigation measures. Wind mitigation measures were developed through iterative wind tunnel testing. These measures would be inherent to the Revised Scheme and as such, the wind microclimate at the Revised Scheme has been presented as such. Should any of these measures not be included within the Revised Scheme or be adjusted, wind conditions may be likely to differ from those discussed within this chapter. A full list of the wind mitigation measures included within the Revised Scheme has been provided in paragraph 10.8.6.

10.5.21 To provide a realistic scenario of the baseline wind conditions a number of developments in the surrounding area which have commenced construction have been included within the existing surrounding context in Configurations 1 – 3.

- Blossom Street [PA/14/03548];
- The Stage (Plough Yard) [2015/3453];
- 201 – 207 Shoreditch High Street [2015/2403]; and
- Silwex House, Quaker street [16/00392/A1].



10.5.22	Cumulative schemes located within a 360 m radius of the centre of the site and therefore included within the wind tunnel model surrounding context in Configuration 4 are: <ul style="list-style-type: none"><li>Land within former Truman's Brewery site [12/00090]; and</li><li>Shoreditch Village (183-187 Shoreditch High Street) [2017/0596].</li></ul>
10.5.23	Developments beyond a 360 m radius of the centre of the site would not be expected to modify the wind approaching the site substantially. The likely effects of developments beyond this radius have, however, been included within the analysis of the surrounding terrain detailed in paragraph 10.6.3.
	<b>Strong Winds</b>
10.5.24	The assessment of the wind microclimate also identifies stronger winds as specified by Lawson. The 'strong winds' are defined as wind speeds in excess of 15m/s for more than 0.025% of the time (approximately two hours per year). Exceedance of the 15m/s threshold would indicate a need for remedial measures and careful assessment of the expected use of that location; e.g. is it reasonable to expect cyclists or elderly or very young pedestrians to be present at the location? Wind speeds that exceed 20m/s for more than 0.025% of the time (approximately two hours per year) would represent a safety issue for all members of the population and would require mitigation to provide an appropriate wind environment.
10.5.25	Strong winds are generally associated with areas which would be classified by the Lawson Comfort Criteria as being suitable for 'walking' or as 'uncomfortable', however, they are occasionally concurrent with areas suitable for 'strolling' use. In a residential-led urban development, 'walking' and 'uncomfortable' conditions would not usually form part of the 'target' wind environment in terms of pedestrian comfort and would usually require mitigation to reduce the frequency of, or even eliminate, any strong winds.
10.5.26	In accordance with Lawson's methodology it is RWDI practice to report incidence when wind speeds exceed 15m/s or 20m/s for more than 0.025% of the time (approximately two hours of the year).
10.5.27	Further details of the methodology please refer to <b>ES Addendum Volume 4 Appendix F: Wind Microclimate</b> .
	<b>Defining significance</b>
10.5.28	Most assessments within this ES Addendum broadly define the sensitivity of the receptors that could be affected by the Revised Scheme and the magnitude of impact or change from the baseline conditions to derive the resultant scale and nature of effect. However, in line with the standard, industry accepted methodology for wind microclimate assessments, the scale and nature of effect is determined by the suitability of the location for its intended use.
	<i>Intended Use</i>
10.5.29	The anticipated on-site wind conditions are compared with the intended pedestrian use of the Revised Scheme ( <b>Table 10.5</b> ) because this assessment takes into account changes in pedestrian activities that accompany the development. With respect to the site itself, sensitive receptors include the users of the following locations with the required wind conditions specified for each use: <ul style="list-style-type: none"><li>thoroughfares – targeting strolling wind conditions in all seasons;</li><li>entrances – targeting standing wind conditions in all seasons;</li><li>seating areas – targeting sitting wind conditions during the summer season;</li><li>amenity spaces – targeting sitting to standing wind conditions during the summer season. This is windier than other amenity spaces, as being large mixed-use amenity spaces users can choose to sit in 'calmer' areas, with 'windier' spaces considered acceptable for more active pursuits; and</li><li>terraces – targeting sitting wind conditions during the summer season.</li></ul>
10.5.30	For seasonal usage (such as spill-out seating) it may be necessary to consider locations for different uses for the windiest and the summer season. These locations have been highlighted with an asterisk in <b>Table 10.5</b> .
10.5.31	In addition, the wind conditions in the surrounding area are considered within the area that would potentially be influenced by the Revised Scheme. For sensitive receptors surrounding the site, consideration has been given to the users of the areas listed above where appropriate, as well as: <ul style="list-style-type: none"><li>bus stops – targeting standing wind conditions in all seasons;</li><li>pedestrian crossings – targeting walking wind conditions in all seasons; and</li><li>amenity spaces – targeting sitting wind conditions in the summer season.</li></ul>
10.5.32	It is acknowledged that a direct comparison with the baseline conditions would also be useful where possible to understand changes from the existing (baseline) wind conditions across the site due to the Revised Scheme. This is not necessarily possible for on-site locations where the Revised Scheme would change the intended use of an area,

however, off-site locations will include a comparison with the baseline scenario.

*Effect Significance*

10.5.33	For assessing the potential and residual wind effects of the Revised Scheme, the criteria used to determine the scale and nature of the effect has been based upon the relationship between the desired pedestrian use (as defined by the Lawson Comfort Criteria) at a particular location, and the modelled (predicted) wind conditions at this same location. It should be noted that all adverse effects are considered to be significant and would therefore require mitigation. Negligible and beneficial effects are not considered significant. Accordingly, the following seven-point scale of effect, as set out in <b>Table 10.3</b> , has been used within this assessment.
10.5.34	The geographical impact of the wind microclimate would be expected to be within the site and its immediate surroundings, i.e. a local impact, for all measurement locations. Additionally, all operational impacts would be permanent and long term.
10.5.35	It should be noted that off-site locations would only be deemed to have an adverse effect should conditions be windier than suitable by the criteria. As discussed above, these effects would be significant. Off-site locations would only be deemed to have a beneficial effect if the wind conditions were to be improved relative to the criteria because of the Revised Scheme. In line with on-site effects, beneficial effects would not be significant.
10.5.36	Strong winds which have the potential to affect pedestrian safety are not included within this description of an effect, but are reported separately within this chapter, as it is RWDI practice to report incidence, but strong winds cannot be scaled to major/moderate/minor. All occurrence of strong winds can be considered to be significant and where strong winds occur, remedial measures will be identified, alongside careful assessment of the expected use.

Table 10.3     Scale and Nature of Effect

Scale and Nature of Effect	Description
Major Beneficial	Wind conditions are 3- categories calmer than required
Moderate Beneficial	Wind conditions are 2- categories calmer than required
Minor Beneficial	Wind conditions are 1- category calmer than required
Negligible	Wind conditions are the same or similar to those required
Minor Adverse	Wind conditions are 1- category windier than required
Moderate Adverse	Wind conditions are 2- categories windier than required
Major Adverse	Wind conditions are 3- categories windier than required

**Limitations and Assumptions**

10.5.37	The wind tunnel studies involve the use of physical models of the Revised Scheme and surrounding buildings. Therefore, the accuracy of the drawing information supplied is one of the key factors for the consistency of wind tunnel results. Changes in the geometry or massing of buildings can affect the wind tunnel results.
10.5.38	The instrumentation used in this study provides a quantification of wind conditions at discrete points around the Revised Scheme. The location and number of measurement points have been chosen to cover all key and frequently used areas in the baseline and around the Revised Scheme. However, if the pedestrian activities or intended uses change over time, it is important to ensure that the conditions are re-assessed, or additional measurements are carried out to adequately assess the pedestrian-level wind conditions.
10.5.39	The assessment within the wind tunnel is based on worst-case wind speeds, expected to be encountered during the winter season (December, January and February) in the UK.
10.5.40	Additional consideration has been made for summer wind conditions due to the presence of outdoor amenity spaces and rooftop terraces. This complies with the standard methodology set out by Lawson for wind microclimate assessments. It is expected that use of outdoor amenity spaces and rooftop terraces for sitting will be limited to the summer season. During the windiest season, it would be expected that these spaces would increase a criteria to be suitable for standing use.

# 10.6 BASELINE ASSESSMENT AND IDENTIFICATION OF KEY RECEPTORS

## Meteorological Data

- 10.6.1
- The UK Meteorological Office supplies records of the number of hours that wind occurs for ranges of wind speed (using the Beaufort Scale) and by direction. Meteorological data combined from three London airports (Gatwick, Heathrow and Stansted Airports), shown in Figure 10.1, was used in this assessment as this is deemed to provide the best representation of the local wind microclimate for the London area.
- 10.6.2
- The meteorological data obtained for London indicates that the prevailing wind throughout the year is from the south-west (i.e. 210 to 240 degrees on the compass). This is typical for many areas of south-eastern 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.
- 10.6.3
- The meteorological data were corrected to standard conditions of 10m above open flat level country terrain. The meteorological model was then adjusted to the site conditions taking account of the terrain roughness using the BREVe3.2 software package which models the wind characteristics caused by changes in the terrain roughness at the stated reference height of 120m above the surface. The results are shown in **Table 10.4**.

Figure 10.1 Seasonal Wind Roses for London (combined data from Heathrow, Gatwick and Stansted Airports)

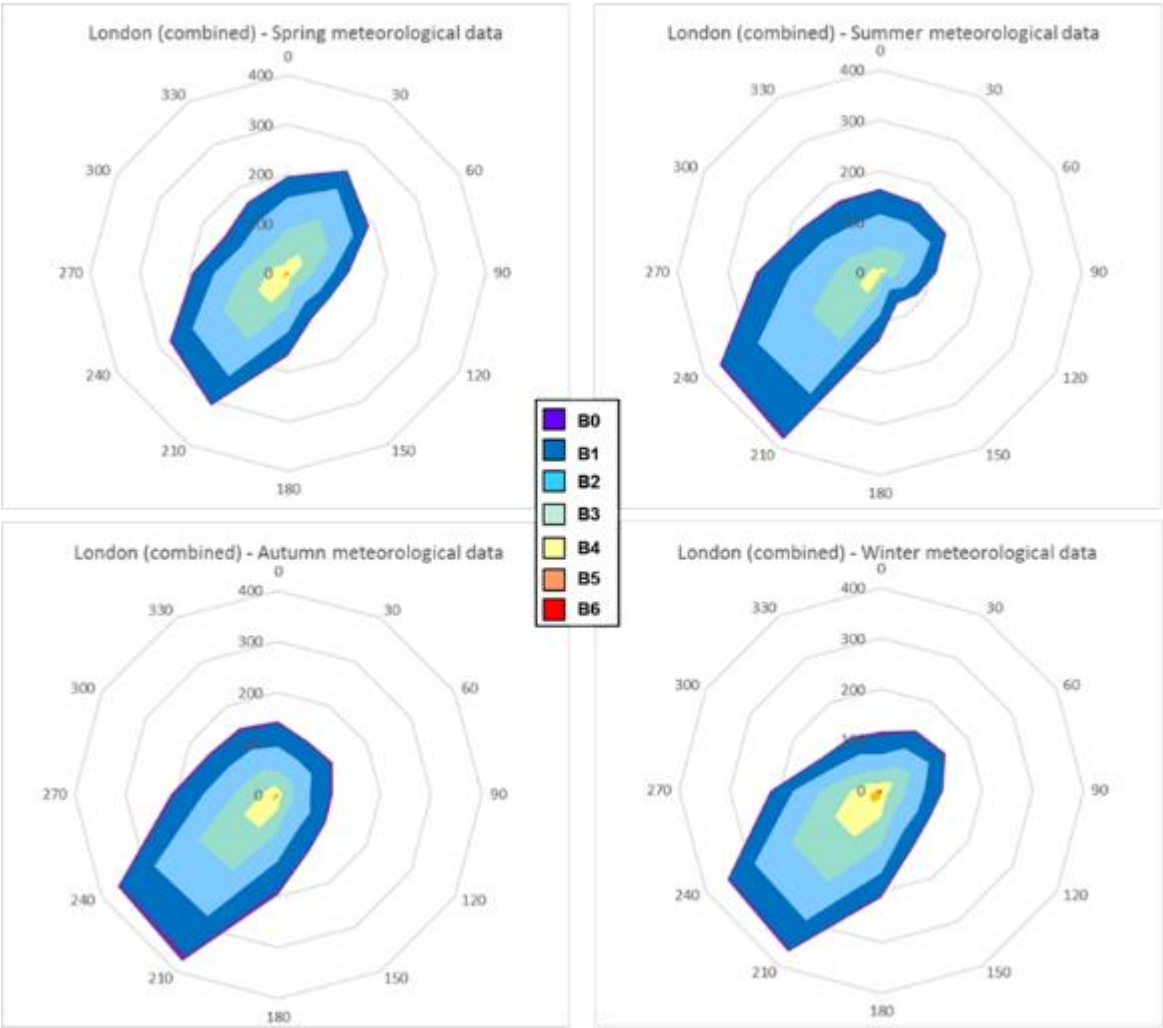


Table 10.4 Site Meteorological Data Adjustment

Direction (°N)	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean Factor	1.38	1.42	1.43	1.41	1.36	1.35	1.41	1.39	1.37	1.33	1.34	1.35

## Baseline Assessment

### Configuration 1: Existing site with the Existing Surrounding Buildings

- 10.6.4
- Discussion of the wind conditions at the existing site with the existing surrounding buildings is based on results presented in **Figure 10.2** for the windiest season at ground level and **Figure 10.3** for the summer season at ground level.
- Pedestrian Comfort
- 10.6.5
- During the windiest season (**Figure 10.2**) wind conditions at the existing site range from suitable for sitting to strolling use at ground level.
- 10.6.6
- During the summer season (**Figure 10.3**) wind conditions are predominantly suitable for sitting use with localised conditions suitable for standing use beneath the London Overground bridge and on the Shoreditch High Street carriageway.
- Thoroughfares
- 10.6.7
- Wind conditions on Bethnal Green Road, Sclater Street, Brick Lane, Quaker Street, Wheler Street, Commercial Street and Shoreditch High Street are suitable for standing and sitting use during the windiest season (**Figure 10.2**). Standing and sitting use conditions are one and two categories calmer than desired for pedestrian thoroughfares. All thoroughfares surrounding the site would therefore have conditions suitable for thoroughfare use.
- Entrances
- 10.6.8
- Entrances to the existing surrounding buildings on Bethnal Green Road, Brick Lane, Commercial Street, Sclater Street, Shoreditch High Street and Quaker Street have wind conditions suitable for standing and sitting use during the windiest season (**Figure 10.2**). Standing and sitting use conditions would be suitable for, and one category calmer than required, for entrance locations.
- Bus stops
- 10.6.9
- Wind conditions at bus stops on Bethnal Green Road are suitable for sitting use during the windiest season (**Figure 10.2**), acceptable conditions for bus stops where standing conditions or calmer are required.
- Ground Level Amenity Space
- 10.6.10
- Existing outdoor café seating on Sclater Street (locations 129 and 131) and a basketball court on Quaker Street (location 52) are suitable for sitting use during the summer season (**Figure 10.3**).
- Strong Winds
- 10.6.11
- There are no instances of winds exceeding 15m/s for more than 0.025% of the time (approximately two hours per year) at the existing site with the existing surrounding buildings.



Figure 10.2 Configuration 1: Existing site with the Existing Surrounding Buildings – Windiest Season Ground Level

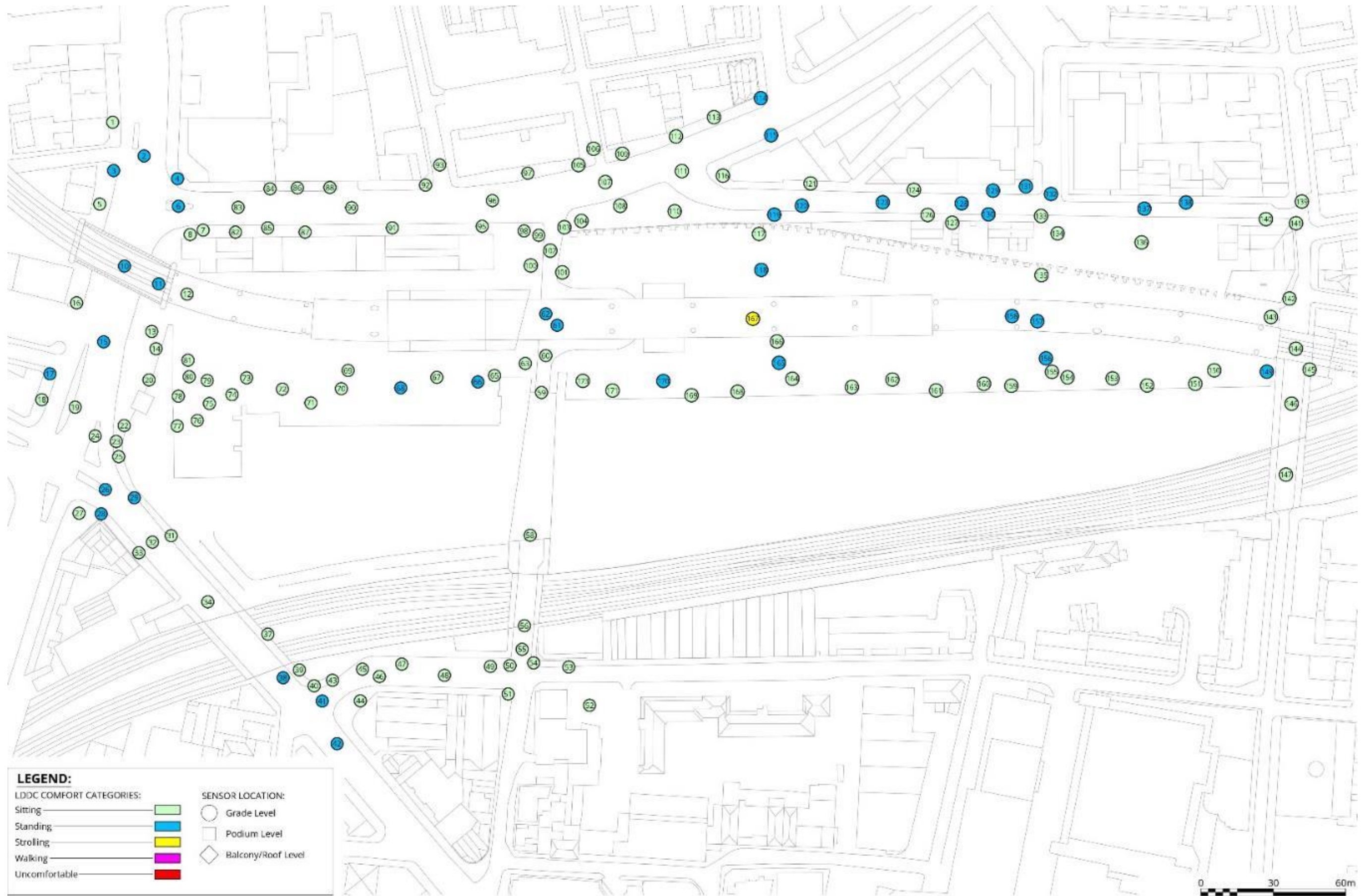
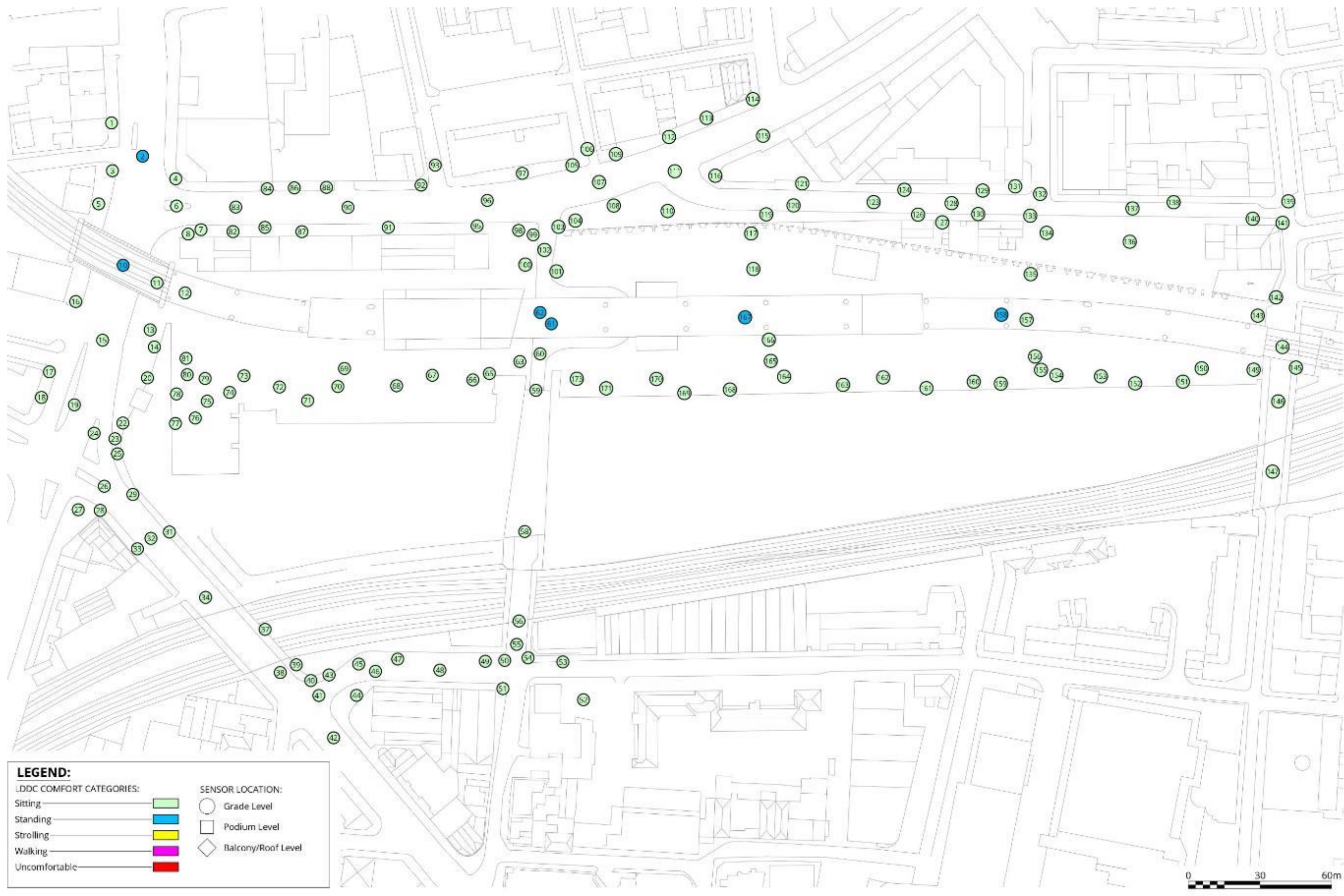




Figure 10.3 Configuration 1: Existing site with the Existing Surrounding Buildings – Summer Season Ground Level



Identification of Key Receptors

- 10.6.12

In assessing the 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 the Revised Scheme include all pedestrians using or visiting the Revised Scheme and the surrounding areas, as well as pedestrians and cyclists on surrounding thoroughfares, at entrances to the surrounding buildings, pedestrian transport stops and surrounding amenity spaces, including café spill out space and outdoor seating.
- 10.6.13

Wind conditions have been assessed using instrumentation at up to 243 measurement locations (**Table 10.5**) across the Revised Scheme and within the surrounding area. The locations of the probes are fixed and have been determined based on an examination of architectural drawings, reflecting the expected use of the Revised Scheme.
- 10.6.14

Where measurement locations represent areas that may have multiple uses (e.g. a bus stop on a thoroughfare) wind conditions have been assessed for the more sensitive use. As such, wind conditions at platform level have been assessed for amenity use during the summer season. During the windiest season, when amenity spaces are not expected to be used, the platform level has been assessed for pedestrian thoroughfare and entrance (locations 212 and 222 only) use.

Table 10.5    Likely Resource / Receptor

Receptor	Development Plot/ Off-site Location	Receptor Reference (Probe measurement number)
On-site		
Amenity spaces	Ground Level, Plot 5	125, 127
	Podium	175-211, 213-221, 223-230, 232, 233, 235, 236
	Terraces / Balconies	237- 243
Entrances	Plot 1	12, 67, 69, 73, 81, 82, 89, 94, 98, 100
	Plot 2	14, 25, 31, 71, 76, 222, 231, 234
	Plot 3	37, 39, 45, 47, 49
	Plot 5	126, 130, 135
	Plot 7	152, 159, 161, 168, 169, 172
	Plot 8a	212
	Plot 10a	61, 167, 170
	Plot 10b	158, 162, 166
Thoroughfares	Ground level, between buildings	21, 30, 35, 36, 55-60, 62-66, 68, 70, 72, 74, 75, 77-80, 99, 101, 102, 117, 118, 143, 148-151, 153-157, 160, 163-165, 171, 173, 174
Off-site		
Amenity spaces	Sclater Street	129, 131
	Quaker Street	52
Bus stops	Bethnal Green Road	86, 91
Entrances	Bethnal Green Road	88, 112-114
	Brick Lane	141, 145
	Commercial Street	28, 33

Receptor	Development Plot/ Off-site Location	Receptor Reference (Probe measurement number)
	Sclater Street	116, 121, 124, 138, 140
	Shoreditch High Street	1, 4, 5, 18
	Quaker Street	44
Thoroughfares	Bethnal Green Road	7, 8, 83-85, 87, 90, 92, 93, 95-97, 103-109, 111, 115
	Brick Lane	139, 142, 144, 146, 147
	Commercial Street	26, 29, 32, 34, 38, 40-42
	Sclater Street	110, 119, 120, 122, 123, 128, 132-134, 136, 137
	Shoreditch High Street	2, 3, 6, 9-11, 13, 15-17, 19, 20, 22-24, 27
	Quaker Street	43, 46, 48, 50, 51, 53, 54

10.7 IDENTIFICATION AND DESCRIPTION OF CHANGES LIKELY TO GENERATE EFFECT

Construction Phase

- 10.7.1

Wind conditions during the construction phase would be expected to gradually adjust from those of the existing site to those of the Revised Scheme. The above flow behaviour would be expected to develop and gain influence as construction progresses.

Operational Phase

- 10.7.2

The wind conditions at the Revised Scheme are expected to be due to either one, or a combination of the generalised flow behaviours detailed below:

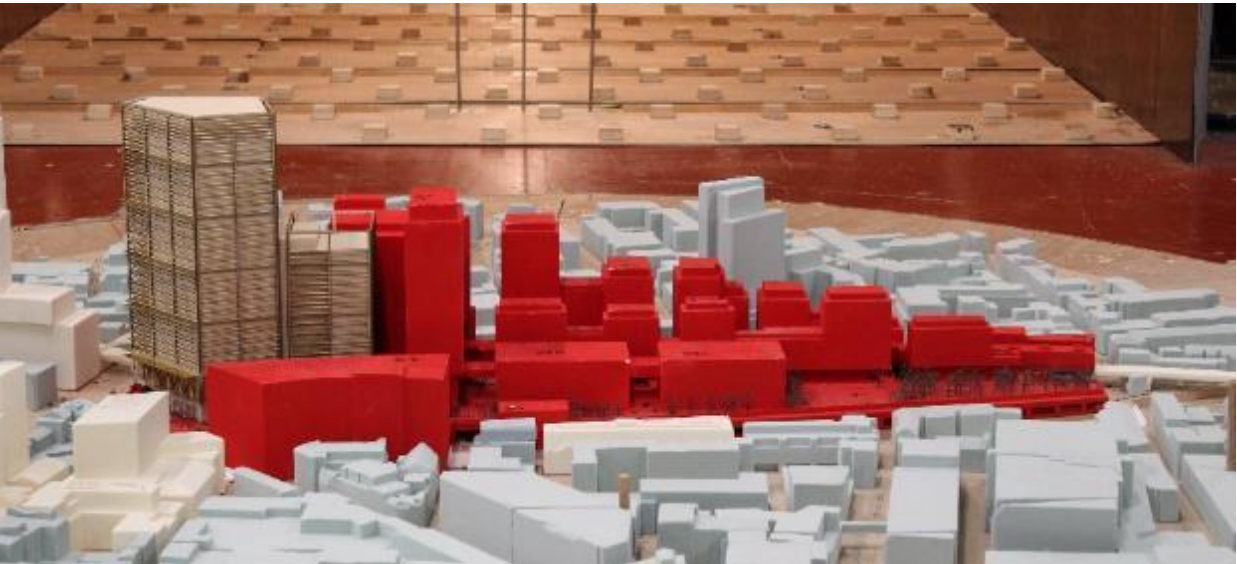
- Down-washing of the wind occurs when a building is taller than its surrounding buildings. The taller scheme forces high level winds to ground level where they create locally high wind speeds in the pedestrian realm.
  - Channelling of the wind occurs between buildings of similar height when in close proximity to each other. Windy conditions occur at pedestrian level since the flow accelerated as it is "squeezed" between the buildings.
  - Corner acceleration around building corners may occur due to the difference in pressure on the upwind and downwind façades (low pressure zones on the leeward side and zones of higher pressure on the windward side of the building). This effect is particularly pronounced around sharp corners which create localised windy areas in the vicinity of the corner where the flow is accelerated around the building.



# 10.8 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

10.8.1 The Revised Scheme was originally tested within the physical wind tunnel to identify the suitability for both comfort and safety of pedestrians. The model (Figure 10.4) was originally tested devoid of any landscaping or mitigation measures to provide a conservative estimation of how the Revised Scheme would perform.

Figure 10.4 Physical Model of the Revised Scheme in the Existing Context



- 10.8.2 The initial testing identified that whilst comfort conditions were largely achieved across the scheme there were a number of locations that would be windier than desired for both comfort and safety of pedestrians. Wind conditions exceeding 15m/s for more than approximately two hours per year would have the potential to be a safety concern for cyclists and more vulnerable pedestrians and winds exceeding 20m/s would be a safety concern for all pedestrians.
- 10.8.3 The main areas identified as windier than desired were primarily on Shoreditch High Street (mainly below the railway bridge and on the junction with Commercial Street) and in close proximity to Building 2 and the listed wall on Shoreditch High Street. As such, wind mitigation measures necessary to improve wind conditions for pedestrians using the surrounding area and for occupants of the site were developed through iterative wind tunnel testing.
- 10.8.4 Following the initial testing a range of over 50 different mitigation measures in different combinations were tested over a total of 8 mitigation workshops and 74 mitigation runs. These mitigation measures were developed to reduce the instances of strong winds (that would exceed both 15m/s and 20m/s) at ground and platform levels and improve comfort conditions across the site where necessary. Measures were developed that were suitable and deliverable both practically and in design terms, whilst limiting the impact on the listed structures, and improving wind conditions on and off site to create a safe and comfortable environment for pedestrians.
- 10.8.5 The initial scheme devoid of landscaping and any mitigation measures identified unsuitable conditions in terms of comfort and safety in the following areas:
- to the southeast of Building 2 at podium and ground level;
  - along Shoreditch High Street, under the railway bridge;
  - the area of public realm between Building 1 and Building 2;
  - under the Overground underpass on Braithwaite Street; and
  - the area between the southeast corner of Building 2 and Building 8A.
- 10.8.6 The different mitigation measures were tested included the following main categories:
- Landscaping – The proposed landscaping scheme was tested and finessed to find the most appropriate combination of planting and trees, and the most effective locations on both the podium and at ground level, whilst also taking into account the potential to affect the setting of the listed Oriel.
  - Porous Screens and Elevated Porous Screens – The range and quantity of porous screens were tested on top of the podium (2m wide x 7m high), on Shoreditch High Street (1.5m wide and 6m tall on 9 m polls (between 4 and 11), and attached to the Oriel (7 x 1.5m wide 7m high mounted 3 m above ground).

- Banners on Flag Poles – Between 6 - 11 elevated banners were tested in staggered arrangements along thoroughfare to north of Plot 2. These ranged between 1.5m wide, 6m tall, approximately 50% porous, 6m above ground suspended from poles.
- Baffles - Baffles suspended from the underside of the Overground structure where this crosses pedestrian thoroughfares, 1.5m high in staggered arrangement.
- Canopies - A number of canopy combinations were tested below and above the transfer structure on Building 2 of both solid and porous varieties ranging in depth between 1.8 m and 7m. Small canopies were also tested mounted to the Oriel to see whether effective on Shoreditch High Street.
- Horizontal and Vertical Fins – Porous and solid fins were tested attached vertically and horizontally to Building 2 ranging from 10 - 28m tall vertical fins and 1.8 - 3 m horizontal fins with varied gaps and at a range of floor heights; and
- Pergolas – Pergolas were tested on top of the podium and at key points to the east of Building 2.

10.8.7 A summary of the mitigation measures is presented in **ES Addendum Volume 4 Appendix F: Wind Microclimate**. The embedded mitigation that was developed for both the mid-construction scenario and operational scenario is detailed in the sections below.

## Construction Phase

10.8.8 A mid-construction scenario which consisted of the completed Building 2 and Plot 7 in isolation (the detailed elements of the planning application) was assessed to establish the effects after the first phase of the scheme. The model is shown in Figure 10.5.

Figure 10.5 Plots 2 and 7 only Physical Model (mid-construction scenario)



## Embedded Mitigation Measures

- 10.8.9 Progressive mitigation focusing on the areas described in paragraph 10.8.5 and applying the measures in paragraph 10.8.6 was developed to reduce the occurrence of strong winds and improve comfort conditions in the mid-construction scenario.
- 10.8.10 Following iterative testing it was identified that the most effective measures in reducing down drafting and improving the safety conditions on Shoreditch High Street was the inclusion of horizontal fins at 5 floor intervals on the Southwestern façade of Building 2. These in combination with a 6 m canopy above the transfer structure (also on Building 2), and Landscaping, allowed bulky and inappropriate measures (see Figure 10.6) on top of and in front of the Oriel, listed wall and Shoreditch High Street to be removed. This was determined to be the most appropriate and deliverable solution for reducing the effect upon the setting of the heritage asset whilst enabling a safe and comfortable pedestrian environment.
- 10.8.11 The final mitigation measures that were included as embedded mitigation within the scheme for the mid-construction scenario are discussed in the following section.

## Landscaping

10.8.12 In addition to the proposed landscaping scheme (BGY-SH-XX-00-DR-L-00-101.dwg and BGY-SH-XX-00-DR-L-00-102.dwg provided by Spacehub (received 01/03/2019)) these measures include:



- 1.5 m high shrubs on the Podium to the west of and in close proximity to Building 2;
- Dense planting or hedging at platform level west of Plot 2 running perpendicular from the local Building 2 elevation (in four radial strips) and following the eastern edge of the Oriel (single broken strip), 1.5m in height (including planter) as shown in Figure 10.6;
- Three deciduous trees east of the southwestern corner of Plot 2, 8m tall; and
- Two planters with dense planting or hedging between south eastern corner of Plot 2 and southwestern corner of Plot 8A, 1.5m total high.

Figure 10.6 Final Landscaping Solution on top of the Podium at Building 2



Canopy

- 10.8.13 A solid canopy above the transfer structure 6 m wide on the southwestern façade was deemed to be the most effective shown in Figure 10.7.



Horizontal Fins and Solid Balustrade

- 10.8.14 The horizontal fins found to be the most effective and architecturally appropriate in combination with the other measures were 3m wide protruding from floor levels 5, 10, 15 and 20 with a 1 m gap between fins.
- 10.8.15 Solid balustrade was installed around the Building 2 roof terraces, 1.8m in height. This is represented by Figure as shown in Figure 10.8.

Figure 10.8 Horizontal Fins attached to Building 2



- 10.8.16 During construction of the Revised Scheme it is expected that site access will be restricted, and hoarding will be in place around the site. As construction of the Revised Scheme proceeds wind mitigation measures detailed below for the Operational Phase would be required to be applied in order to avoid windy conditions off-site.

Anticipated Effects

- 10.8.17 Wind conditions during the construction works would be expected to gradually adjust from those of the existing site (Configuration 1), to those presented for the Completed Development (Configuration 2).
- 10.8.18 The wind environment during the construction of the Revised Scheme 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 Revised Scheme. As construction progresses, wind conditions adjusting to those presented for the operational development would represent a temporary **negligible** (not significant) effect. Strong winds exceeding 15m/s and 20m/s for 0.025% of the time (approximately two hours per year) at ground and podium level would be expected to occur on-site until installation of the proposed landscaping scheme and wind mitigation measures has been completed. The implementation of wind mitigation measures and the proposed landscaping scheme as construction progresses would be expected to reduce the occurrence of on- and off-site strong winds during the construction phase such that wind conditions would be suitable for the intended use.

Anticipated Effects of Applying the Minimum Development Parameter

- 10.8.19 Wind conditions in the minimum development parameter scenario have been assessed qualitatively using the professional judgment of an experienced wind engineer. It would be expected that wind conditions would be generally similar to those presented for the construction phase of the maximum development parameter scenario of the Revised Scheme discussed above. Localised improvements in wind conditions may be expected, however, as the massing of the development remains similar, the range of conditions and likely occurrence of strong winds in the absence of embedded mitigation would remain likely.



Operational Phase

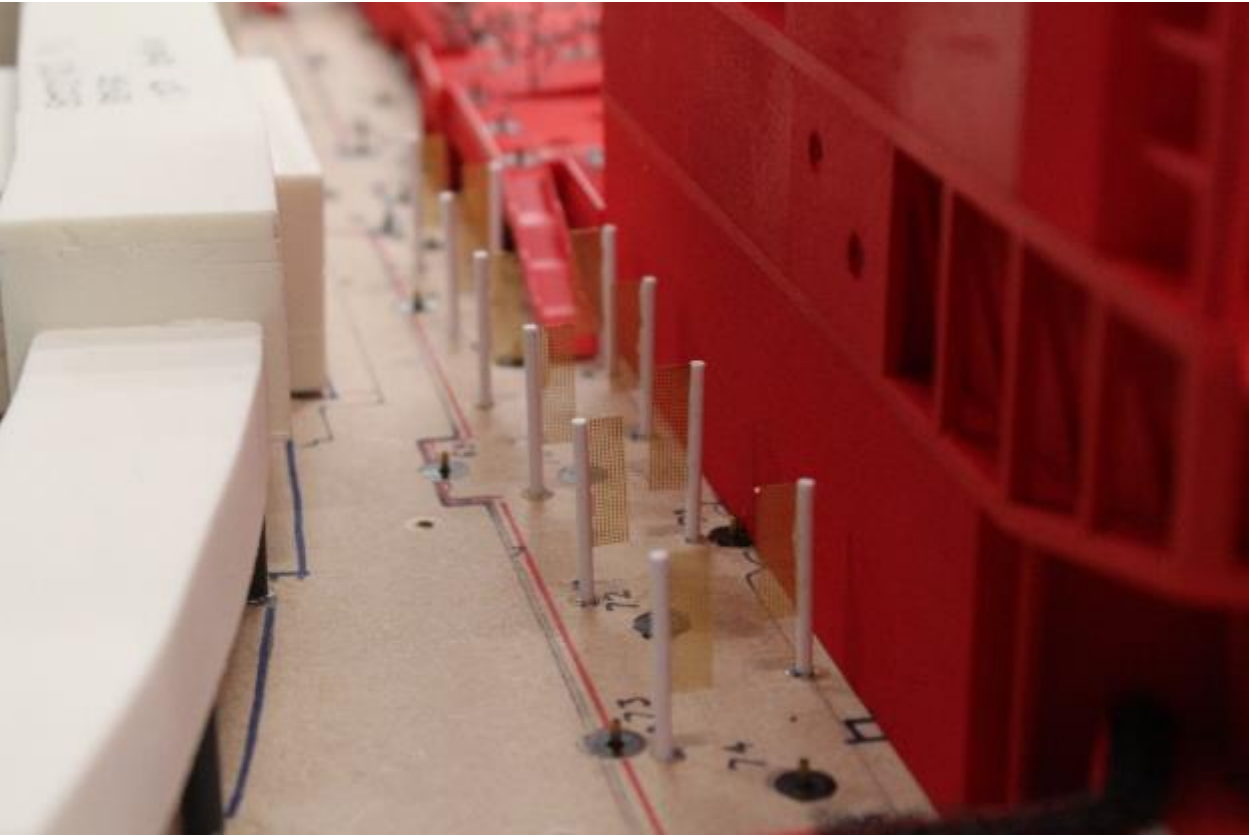
Embedded Mitigation Measures

- 10.8.20 Progressive mitigation focusing on the areas described in paragraph 10.8.5 and applying the measures in paragraph 10.8.6 was developed to reduce the occurrence of strong winds and improve comfort conditions once the Revised Scheme is complete.
- 10.8.21 The embedded mitigation developed for the mid-construction scenario was carried over to the Operational Phase and tested to identify its effectiveness with the rest of the masterplan buildings in place. The embedded mitigation was determined to be as effective as for the operational scenario and therefore was carried over into the full scheme. As outlined in Paragraph 10.8.5 additional areas requiring mitigation were identified at the; area of public realm between Building 1 and Building 2, under the Overground underpass on Braithwaite Street and the area between the southeast corner of Building 2 and Building 8A.
- 10.8.22 In addition to the embedded mitigation outlined in paragraph 10.8.12 – 10.8.15, the following measures were developed for the operational scenario.
- 10.8.23 It should be noted that the measures for the outline plots have been developed to demonstrate how a safe and comfortable environment can be provided, it is very likely that when these building come forward at reserved matter stage the wind environment will improve. This is due to the articulation of the facades and the likely reduction in the extent of the massing. Therefore, at reserved matter stage the Revised Scheme should be reassessed to identify whether these mitigation measures are still required.

Elevated Banners

- 10.8.24 11 elevated banners in a staggered arrangement along the thoroughfare between Buildings 1 and 2 – 1.5m wide, 6m tall, approximately 50% porous and 6m above the ground suspended from poles. These measures were determined to be effective in providing a safe and comfortable pedestrian environment. These measures are shown in Figure 10.9.

Figure 10.9: 6 m Canopy on top of the Transfer Structure



- 10.8.25 To improve the pedestrian environment on Braithwaite Street particularly under the Overground Line, baffles were suspended from the underside of the Overground structure where this crosses pedestrian thoroughfares. The dimension of these were 1.5 m high in staggered arrangement. These were sufficient to provide a safe and comfortable pedestrian environment. The baffles are shown in Figure 10.10.

Figure 10.10 – Baffles on the Underside of the Overground Underpass



- 10.8.26 The area between the southeast corner of Building 2 and Building 8A was also demonstrating less than satisfactory conditions. The following measures were developed to provide a safe and comfortable pedestrian environment:
- two planters with dense planting or hedging between south-eastern corner of Plot 2 and southwestern corner of Plot 8A, 1.5m total high; and
  - solid screens in staggered arrangement between south-eastern corner of Plot 2 and southwestern corner of Plot 8A, 1.5m wide by 2m in height, these are shown in Figure 10.11.

Figure 10.11 – Planters and Solid screens between Building 2 and 8A



- 10.8.27 With the inclusion of the embedded measures listed above, wind conditions at the site and the surrounding area would be suitable for their intended use for the operational phase with no instances of strong winds.

Anticipated Effects

**Configuration 2: Revised Scheme Buildings 2 and 7 with, Landscaping, Wind Mitigation and the Existing Surrounding Buildings**

10.8.28 Discussion of the wind conditions at the Revised Scheme Building 2 and Building 7 with the existing surrounding buildings is based on results presented in **Figure 10.12** and **Figure 10.13** for the ground and platform level respectively during the windiest season and **Figures 10.14** and **Figures 10.15** for the ground and platform levels respectively during the summer season, when amenity spaces are expected to be most frequently used. Balcony and terrace levels are presented in **Figure 10.8** for the summer season.

*Pedestrian Comfort*

10.8.29 With Building 2 and 7 of the Revised Scheme completed, wind conditions at and surrounding the site would range from suitable for sitting to strolling use during the windiest season (**Figure 10.12**). These conditions would be windier than desired at the existing site to the west and southwest of the Revised Scheme along Shoreditch High Street, however, conditions would be suitable for the intended use on pedestrian thoroughfares, at bus stops and at entrance locations.

10.8.30 During the summer season, wind conditions at ground and platform levels (**Figures 10.13** and **10.14** respectively) would range from suitable for sitting to standing use, acceptable conditions for the proposed on-site and existing off-site amenity spaces.

Thoroughfares

10.8.31 Wind conditions on the thoroughfare to the north of Plot 2 would range from suitable for strolling to sitting use during the windiest season (**Figure 10.12**). Strolling wind conditions would be suitable for pedestrian thoroughfare use and would represent a negligible (not significant) effect. Wind conditions suitable for sitting and standing use would be one and two categories calmer than required for a pedestrian thoroughfare and would represent a minor beneficial (not significant) and moderate beneficial (not significant) effect.

10.8.32 During the windiest season the platform level (**Figure 10.13**) would be used for pedestrian access to the Revised Scheme and would therefore be considered a pedestrian thoroughfare. Wind conditions at platform level would range from suitable for sitting to strolling use during the windiest season. Strolling use conditions would represent a negligible (not significant) effect, standing conditions would represent a minor beneficial (not significant) effect and sitting use conditions would represent a moderate beneficial (not significant) effect.

10.8.33 Wind conditions on thoroughfares surrounding the Revised Scheme would be suitable for sitting to strolling use during the windiest season (**Figure 10.12**). Wind conditions suitable for strolling use on Shoreditch High Street would be windier than in the baseline scenario, however, would be acceptable for pedestrian thoroughfare use. Wind conditions suitable for sitting and standing use on other thoroughfares surrounding the development would be similar to those in the baseline scenario. Wind conditions on off-site thoroughfares would therefore represent a negligible (not significant) effect.

Entrances

10.8.34 Entrances to the retail units on Shoreditch High Street and Commercial Street and the western entrances to Building 2 at ground floor level would have wind conditions suitable for standing use during the windiest season (**Figure 10.12**). Wind conditions suitable for sitting use at the northern ground floor entrance to Building 2 would be one category calmer than required for an entrance location. As such, wind conditions at entrances to the Revised Scheme would represent a negligible (not significant) to minor beneficial (not significant) effect.

10.8.35 At platform level (**Figure 10.13**), entrances on the southern elevation of Building 2 (location 222) would be suitable for standing use during the windiest season, acceptable conditions for entrance locations. These conditions would represent a minor beneficial (not significant) effect.

10.8.36 Wind condition at entrances to the surrounding building would be suitable for standing or sitting use during the windiest season (**Figure 10.14**), acceptable for, or calmer than required for entrance use. These conditions would be similar to those in the baseline scenario and would therefore represent a negligible (not significant) effect.

Bus Stops

10.8.37 Wind conditions at bus stops on Bethnal Green Road to the north of the site would have wind conditions suitable for sitting and standing use during the windiest season (**Figure 10.12**). Standing and sitting conditions at bus stops would be suitable for, or calmer than required, for the intended use and similar conditions to those in the baseline scenario. As such, these conditions would represent a negligible (not significant) effect.

Ground Level Amenity Space

10.8.38 Amenity spaces at ground level in Configuration 2 are existing spill out seating on Sclater Street at the junction with Cygnet Street and a sports court on Quaker Street. Wind conditions within these amenity spaces would be suitable for sitting use during the summer season (**Figure 10.14**), acceptable conditions for outdoor seating and calmer than would be required for an activity space such as a sports court. As these conditions are similar to those in the baseline scenario they would represent a negligible (not significant) effect.

Platform Level Amenity Space

10.8.39 At platform level, embedded landscaping and wind mitigation measures would have a mix of wind conditions suitable for sitting and standing use during the summer season (**Figure 10.15**). Conditions to the west of Building 2 would be suitable for sitting use, with an increase in standing use conditions around the southeastern corner of Building 2. These conditions would be acceptable for large amenity spaces during the summer season provided any seating provision is located in those area which would be suitable for sitting use. Conditions at platform level amenity space would therefore represent a negligible (not significant) effect.

Terrace and Balcony Level Amenity Space

10.8.40 Wind conditions suitable for sitting use on the Building 2 eastern roof terraces during the summer season (**Figure 10.16**) with the proposed landscaping and a 1.8 m tall solid balustrade would be suitable for amenity use. These conditions would therefore represent a negligible (not significant) effect.

10.8.41 Terraces around the western corners of Building 2 would have conditions suitable for standing use during the summer season (**Figure 10.16**). Standing use conditions would be one category windier than suitable for these amenity spaces and would therefore represent a minor adverse (significant) effect. A railing type perimeter barrier would be required rather than a solid balustrade to ensure no change in reported wind conditions at ground level.

10.8.42 Balcony locations at the south-eastern corner of Building 2 would have wind conditions suitable for sitting use during the summer season (**Figure 10.16**), acceptable conditions for private amenity use. Conditions on balconies would therefore represent a negligible (not significant) effect.

*Strong Winds*

10.8.43 Embedded wind mitigation measures and the proposed landscaping scheme would be effective at mitigating strong winds that would occur in the absence of these measures (as listed in paragraph 10.8.6) and as such, there would be no instances of strong winds exceeding 15m/s or 20m/s for more than 0.025% of the time (approximately two hours per year) in Configuration 2.



Figure 10.12 Revised Scheme Plots 2 and 7 with Landscaping, Wind Mitigation and Existing Surrounding Buildings – Windiest Season, Ground Level

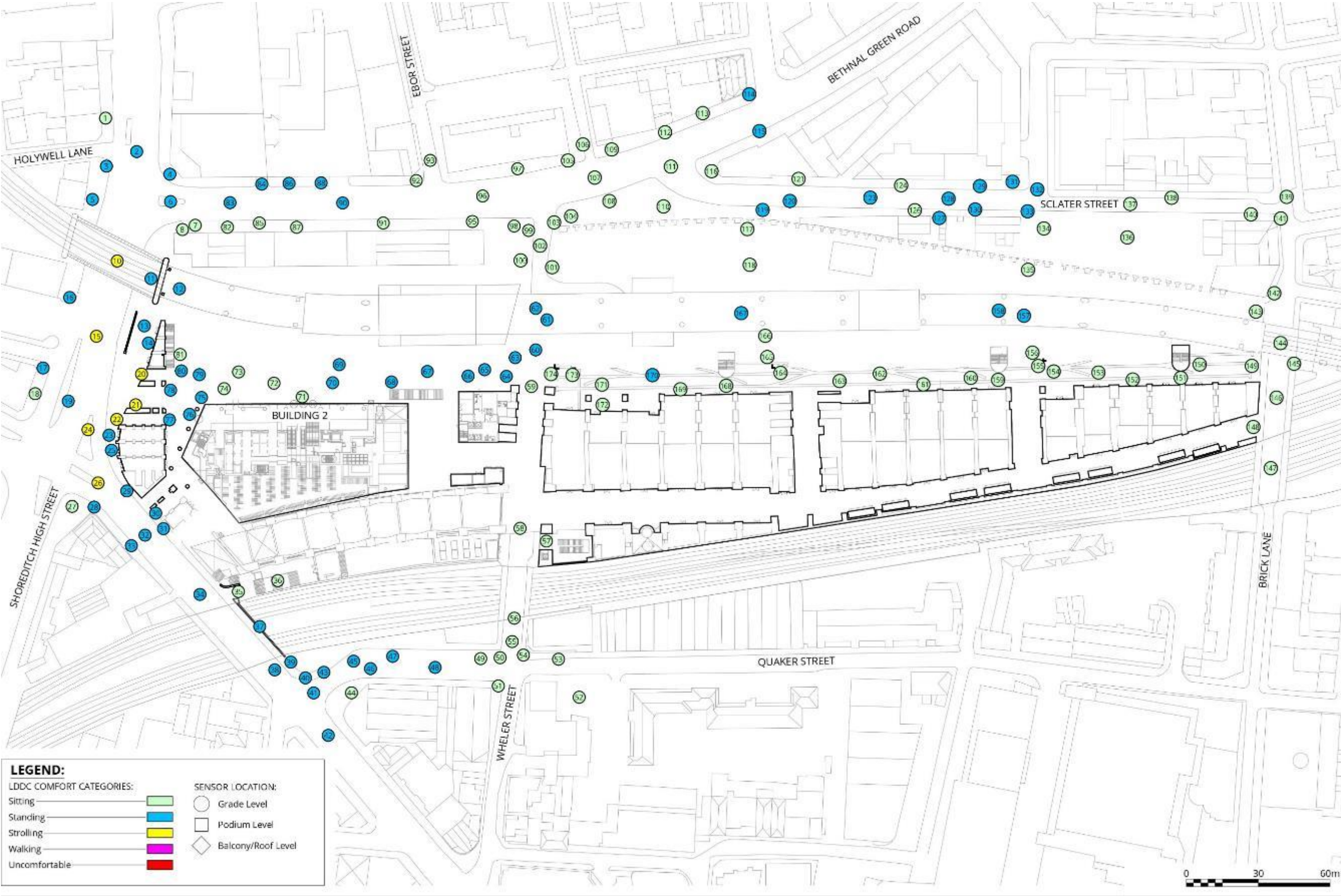


Figure 10.13 Revised Scheme Plots 2 and 7 with Landscaping, Wind Mitigation and Existing Surrounding Buildings – Windiest Season, Platform Level

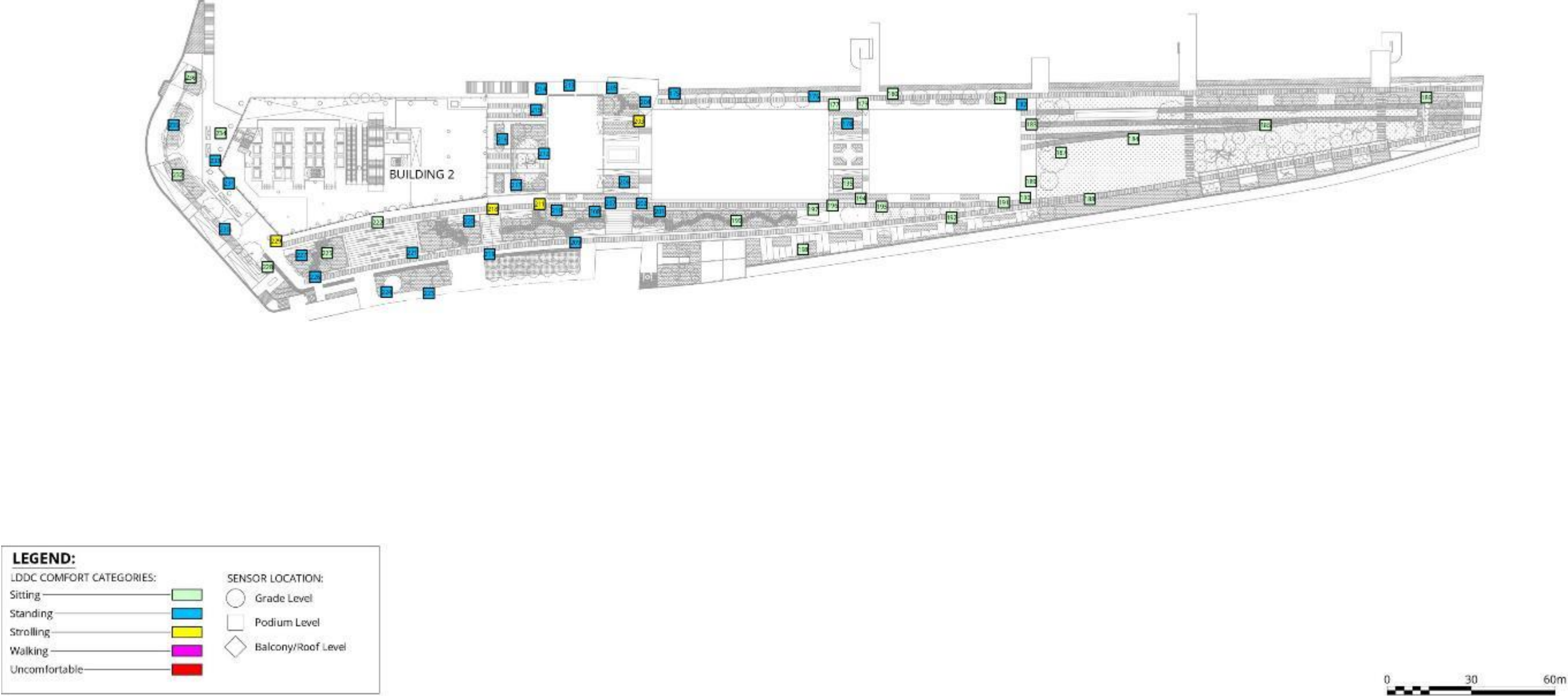




Figure 10.14 Revised Scheme Plots 2 and 7 with Landscaping, Wind Mitigation and Existing Surrounding Buildings – Summer Season, Ground Level

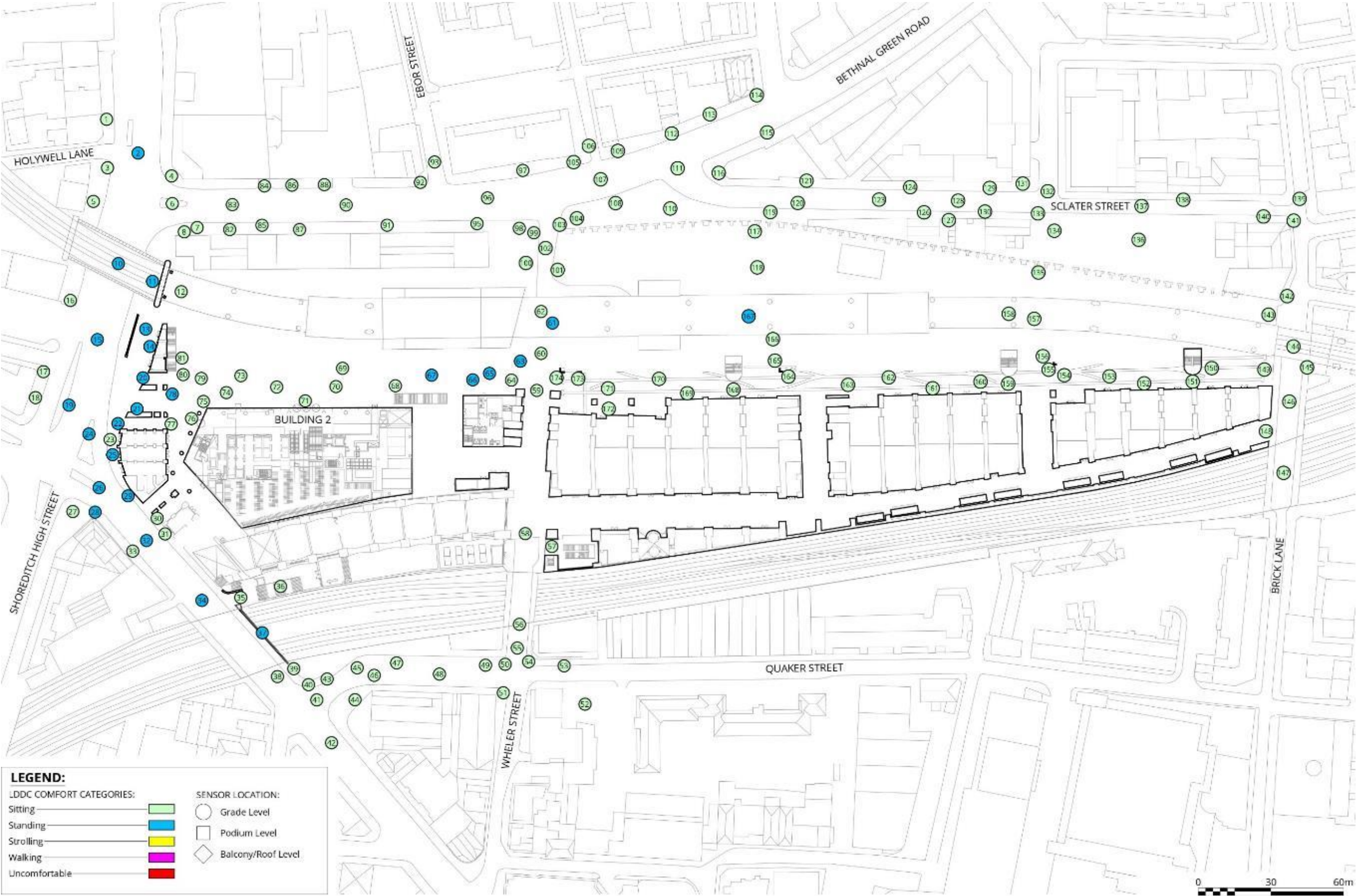




Figure 10.15 Revised Scheme Plots 2 and 7 with Landscaping, Wind Mitigation and Existing Surrounding Buildings – Summer Season, Platform Level

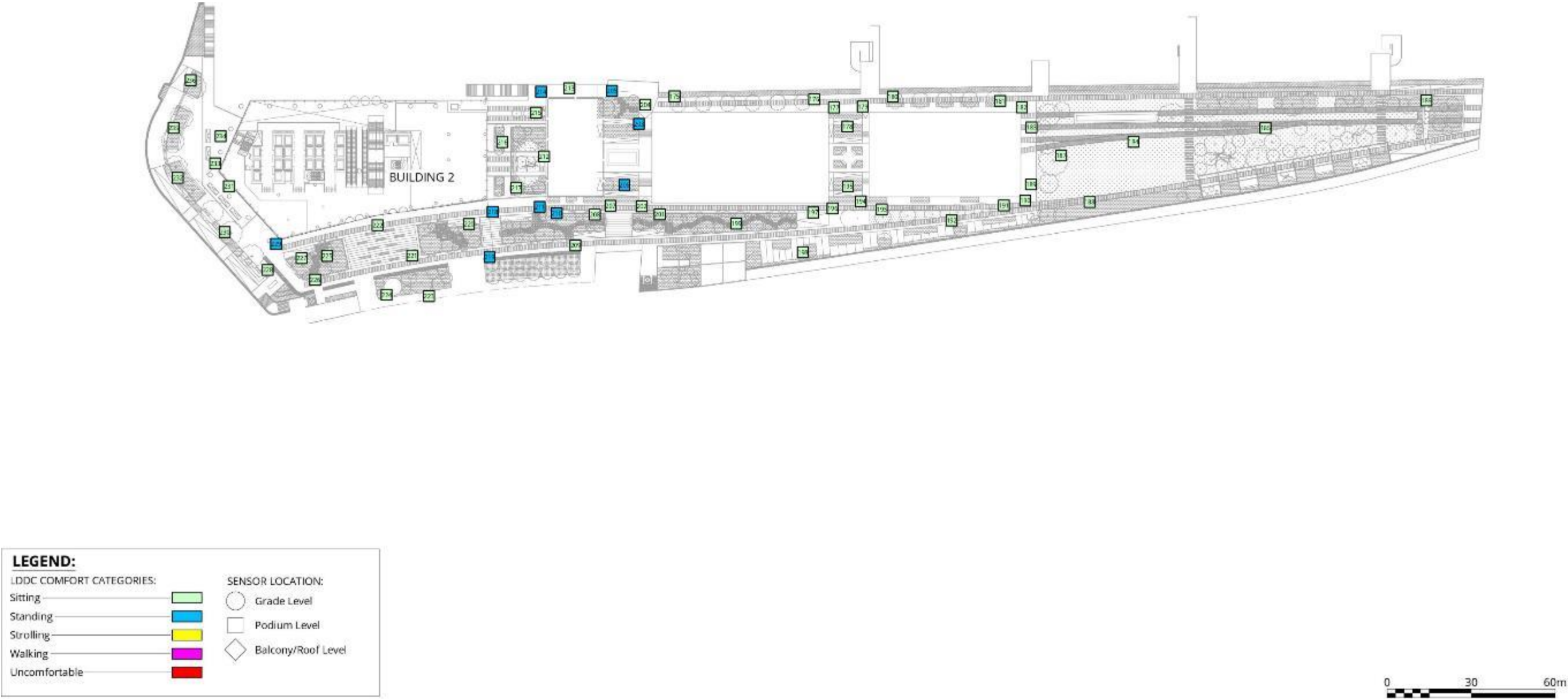
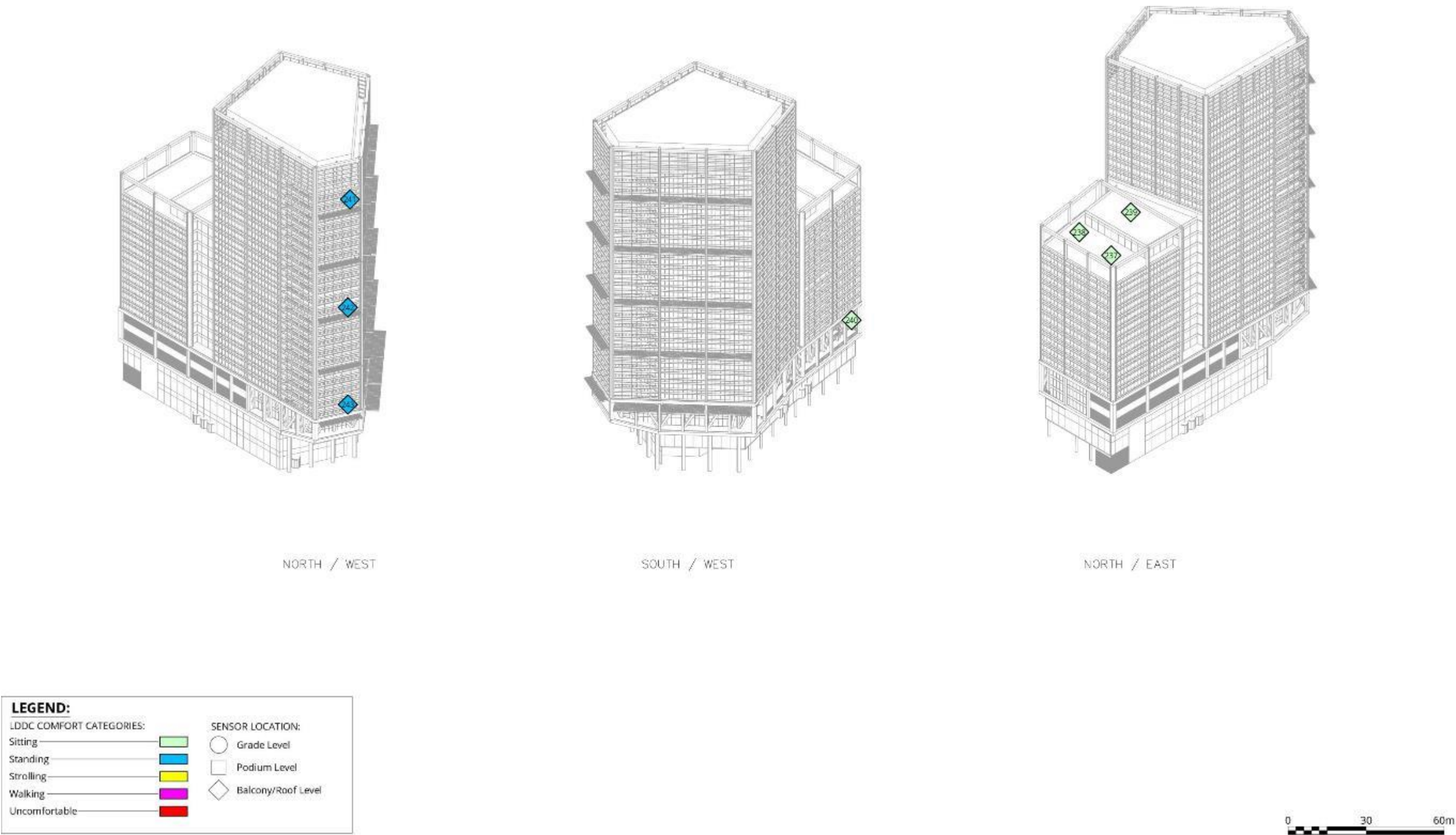


Figure 10.16 Revised Scheme Plots 2 and 7 with Landscaping, Wind Mitigation and Existing Surrounding Buildings – Summer Season, Terrace/Balcony Levels



### *Anticipated Effects of Applying the Development Parameter*

- 10.8.44 Wind conditions in the minimum development parameter scenario have been assessed qualitatively using the professional judgment of an experienced wind engineer. It would be expected that wind conditions would be generally similar to those presented for the operational phase of the maximum development parameter scenario of the Revised Scheme (Configurations 2 – 3) discussed below. Localised improvements in wind conditions may be expected, however, as the massing of the development remains similar, the range of conditions and likely occurrence of strong winds in the absence of embedded mitigation would remain likely.

### **Configuration 3: Revised Scheme with Landscaping Wind Mitigation and the Existing Surrounding Buildings**

- 10.8.45 Discussion of the wind conditions at the Revised Scheme with the existing surrounding buildings is based on results presented in **Figure 10.17** and **Figure 10.18** for the ground and platform levels respectively during the windiest season and **Figures 10.19** and **Figures 10.20** for the ground and platform levels respectively during the summer season, when amenity spaces are expected to be most frequently used. Terrace and balcony level conditions are presented in **Figure 10.21**.

### *Pedestrian Comfort*

- 10.8.46 With the Revised Scheme completed, wind conditions at and surrounding the site would range from suitable for sitting to strolling use during the windiest season (**Figure 10.17**). Conditions would be locally windier, particularly to the west and southwest of the Revised Scheme along Shoreditch High Street and Commercial Road, however, conditions would remain suitable for the intended use on pedestrian thoroughfares, at bus stops and at entrance locations.

- 10.8.47 During the summer season, wind conditions at ground and platform levels (**Figures 10.19** and **10.20** respectively) would range from suitable for sitting to standing use, acceptable conditions for on-site and the existing off-site amenity spaces.

### Thoroughfares

- 10.8.48 Wind conditions on thoroughfares through the site and surrounding the site would range from suitable for sitting to strolling use during the windiest season (**Figure 10.17**). The thoroughfare between Building 1 and Building 2 would have conditions suitable for sitting to strolling use during the windiest season. Wind conditions suitable for strolling use would be suitable for a pedestrian thoroughfare while wind conditions suitable for standing and sitting use would be one and two categories calmer than required for a pedestrian thoroughfare. These conditions on on-site pedestrian thoroughfares would therefore represent a negligible (not significant), minor beneficial (not significant) and moderate beneficial (not significant) effect respectively for the above conditions.

- 10.8.49 As in Configuration 2, during the windiest season the platform level (**Figure 10.18**) would be used for pedestrian access to the Revised Scheme and would therefore be considered a pedestrian thoroughfare. Wind conditions on these thoroughfares would range from suitable for sitting to strolling use during the windiest season. Strolling use conditions would represent a negligible (not significant) effect, standing conditions would represent a minor beneficial (not significant) effect and sitting use conditions would represent a moderate beneficial (not significant) effect.

- 10.8.50 Wind conditions suitable for strolling use on Shoreditch High Street would be windier than in the baseline scenario, however, would remain suitable for the intended use. Wind conditions on all other thoroughfares surrounding the site would be similar to those in the baseline scenario and as such, off-site thoroughfares would have conditions representing a negligible (not significant) effect.

### Entrances

- 10.8.51 Entrances to the Revised Scheme would have wind conditions ranging from suitable for sitting to standing use during the windiest season (**Figure 10.17**). Entrances are generally located in areas sheltered by the surrounding massing of the Revised Scheme, however, the embedded elevated screens between Building 1 and Building 2 would provide shelter to the entrances along the southern side of Building 1. As such, all entrance locations from the thoroughfare through the Revised Scheme, to units on Shoreditch High Street, Bethnal Green Road, Sclater Street, Commercial Road and Quaker Street would have conditions suitable for standing or sitting use, acceptable for, and one category calmer than required, for entrance use respectively. These conditions would therefore represent a negligible (not significant) and minor beneficial (not significant) effect.

- 10.8.52 Entrances to Building 2 (location 222) and Building 8A (location 212) at platform level would have conditions suitable for sitting and standing use respectively during the windiest season (**Figure 10.18**), acceptable conditions for entrance locations. Standing conditions would represent a negligible (not significant) effect and sitting conditions would represent a minor beneficial (not significant) effect.

- 10.8.53 Off-site existing entrance locations would have conditions suitable for standing or sitting use during the summer season (**Figure 10.17**). Standing conditions would be acceptable or entrance locations and sitting use conditions would be one category calmer than required. These conditions would be similar to those in the baseline scenario and as such would represent a negligible (not significant) effect.

### Bus stops

- 10.8.54 Wind conditions at existing bus stops on Bethnal Green Road to the north of Building 1 would have conditions suitable for sitting and standing use during the windiest season (**Figure 10.17**). Standing conditions or calmer would be suitable for bus stop locations and would be similar conditions to those in the baseline scenario. These conditions would therefore represent a negligible (not significant) effect.

### Ground Level Amenity Space

- 10.8.55 During the summer season (**Figure 10.19**), wind conditions within the Building 5 spill out seating space (locations 125 and 127) would be suitable for sitting use. Sitting use conditions would be acceptable for amenity use and, as such, these conditions would represent a negligible (not significant) effect.

- 10.8.56 Existing off-site amenity space on Sclater Street and in the sports court on the southern side of Quaker Street would be suitable for sitting use during the summer season (**Figure 10.19**), similar conditions to the baseline scenario and acceptable conditions for amenity use. These conditions would therefore represent a negligible (not significant) effect.

### Platform Level Amenity Space

- 10.8.57 Wind conditions at platform level with the proposed landscaping scheme and embedded wind mitigation measures would have conditions suitable for sitting and standing use during the summer season (**Figure 10.20**). Standing use conditions between Buildings 2 and 8A and between Buildings 8A and 8B would be suitable for a large amenity space such as the platform level, provided seating provision was located in areas outwith these spaces and suitable for sitting use. Sitting conditions across the rest of the platform level would be suitable for amenity use. This mix of wind conditions at the platform level would represent a negligible (not significant) effect.

### Terrace and Balcony Level Amenity Space

- 10.8.58 As in Configuration 2, wind conditions would be suitable for sitting use on the Building 2 eastern roof terraces during the summer season (**Figure 10.21**). Sitting conditions would be suitable for amenity use representing a negligible (not significant) effect.

- 10.8.59 Terraces around the western corners of Building 2 would be suitable for standing use during the summer season (**Figure 10.21**), conditions one category windier than suitable for amenity use. These conditions would therefore represent a minor adverse (significant) effect. A railing type perimeter barrier would be required rather than a solid balustrade to ensure no change in reported wind conditions at ground level.

- 10.8.60 Balcony locations at the south-eastern corner of Building 2 would have wind conditions suitable for sitting use during the summer season (**Figure 10.21**), as in Configuration 2. These conditions would be acceptable for private amenity use and would represent a negligible (not significant) effect.

### *Strong winds*

- 10.8.61 Wind mitigation measures and the proposed landscaping scheme embedded in the Revised Scheme (as listed in paragraph 10.8.6) would be effective at mitigating strong winds that would occur in the absence of these measures. As such, there would be no instances of strong winds exceeding 15m/s or 20m/s for more than 0.025% of the time (approximately two hours per year) at or surrounding the Revised Scheme.



Figure 10.17 Revised Scheme with Landscaping, Wind Mitigation and Existing Surrounding Buildings – Windiest Season, Ground Level

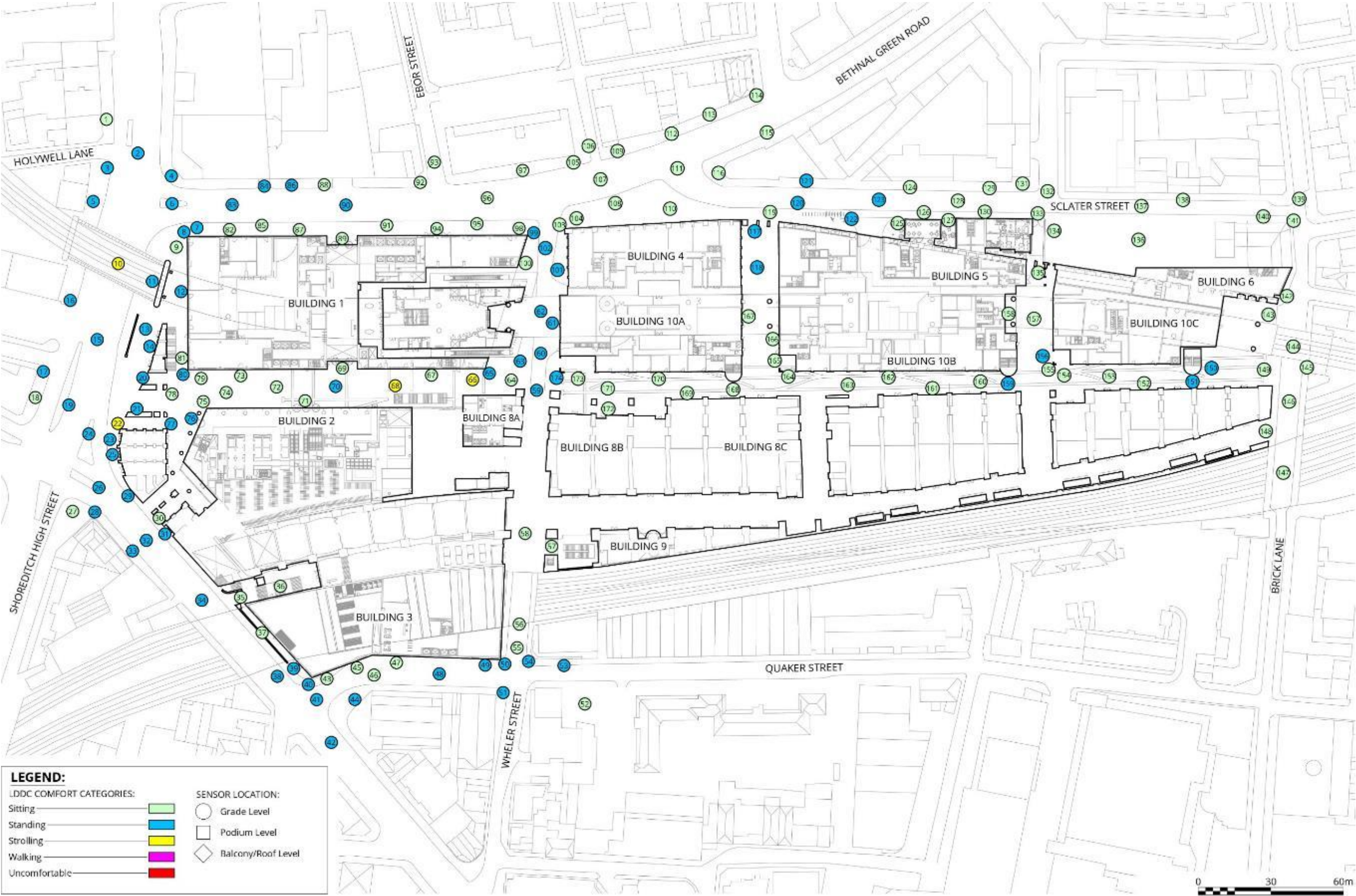




Figure 10.18 Revised Scheme with Landscaping, Wind Mitigation and Existing Surrounding Buildings – Windiest Season, Platform Level

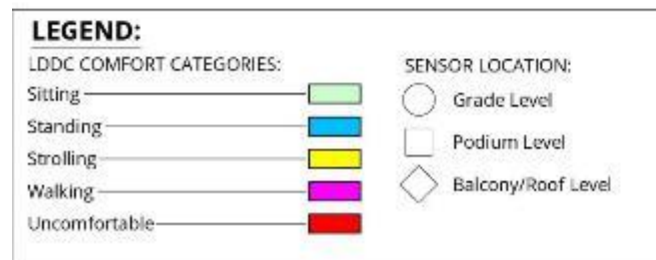
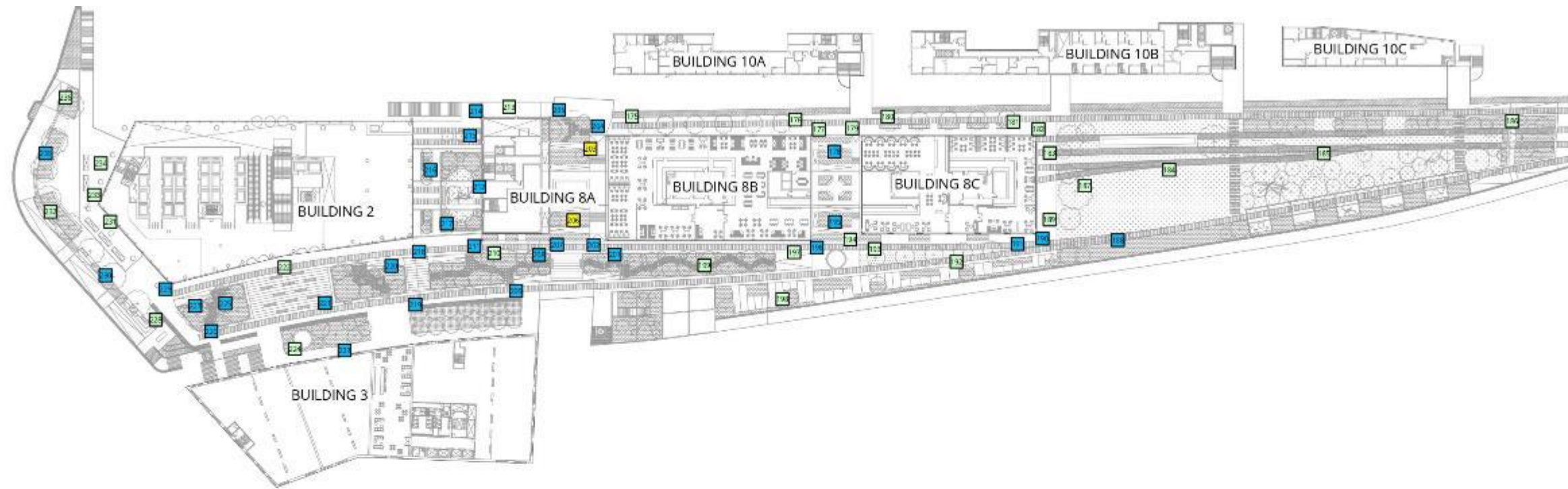




Figure 10.19 Revised Scheme with Landscaping, Wind Mitigation and Existing Surrounding Buildings – Summer Season, Ground Level

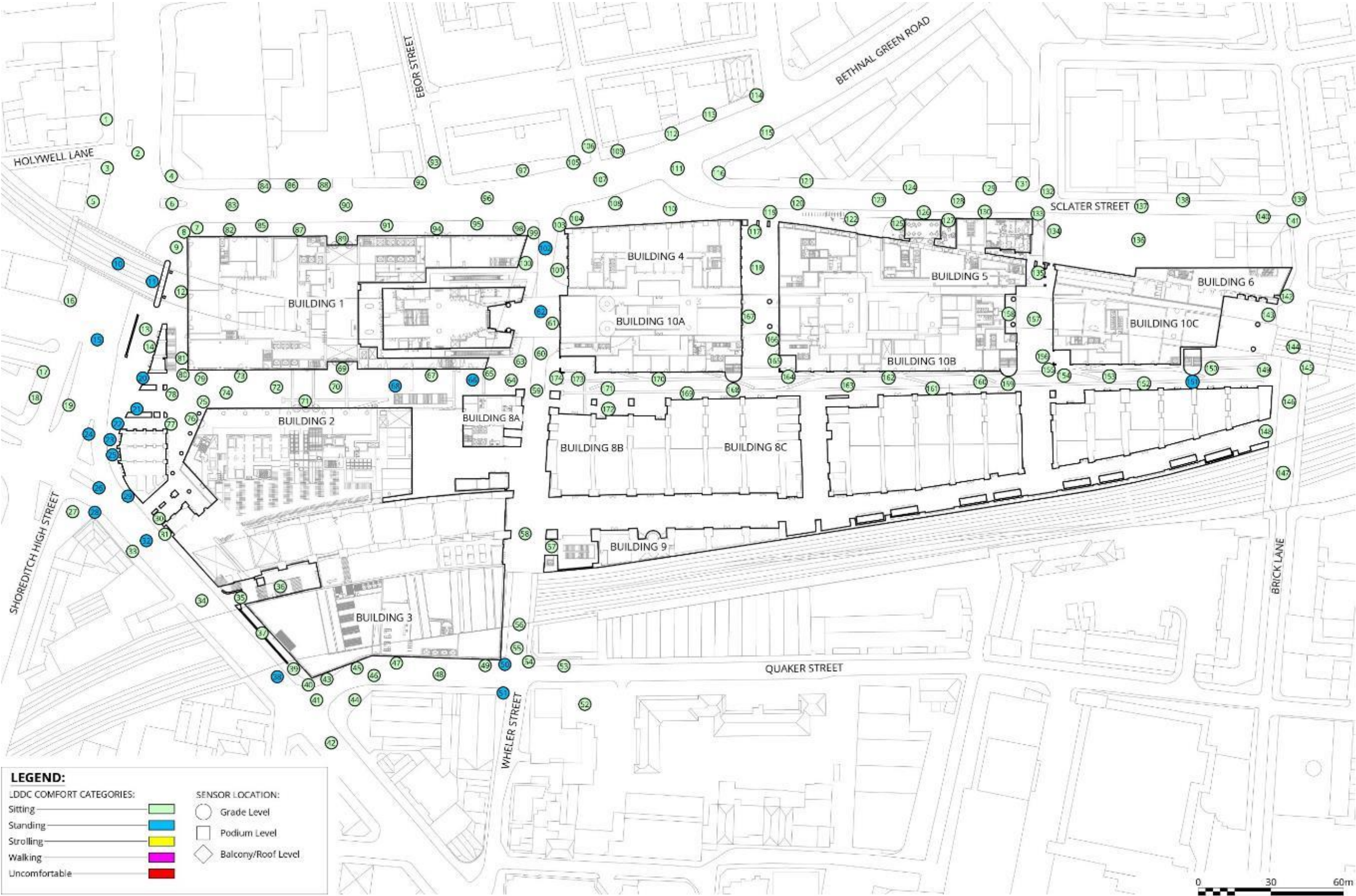


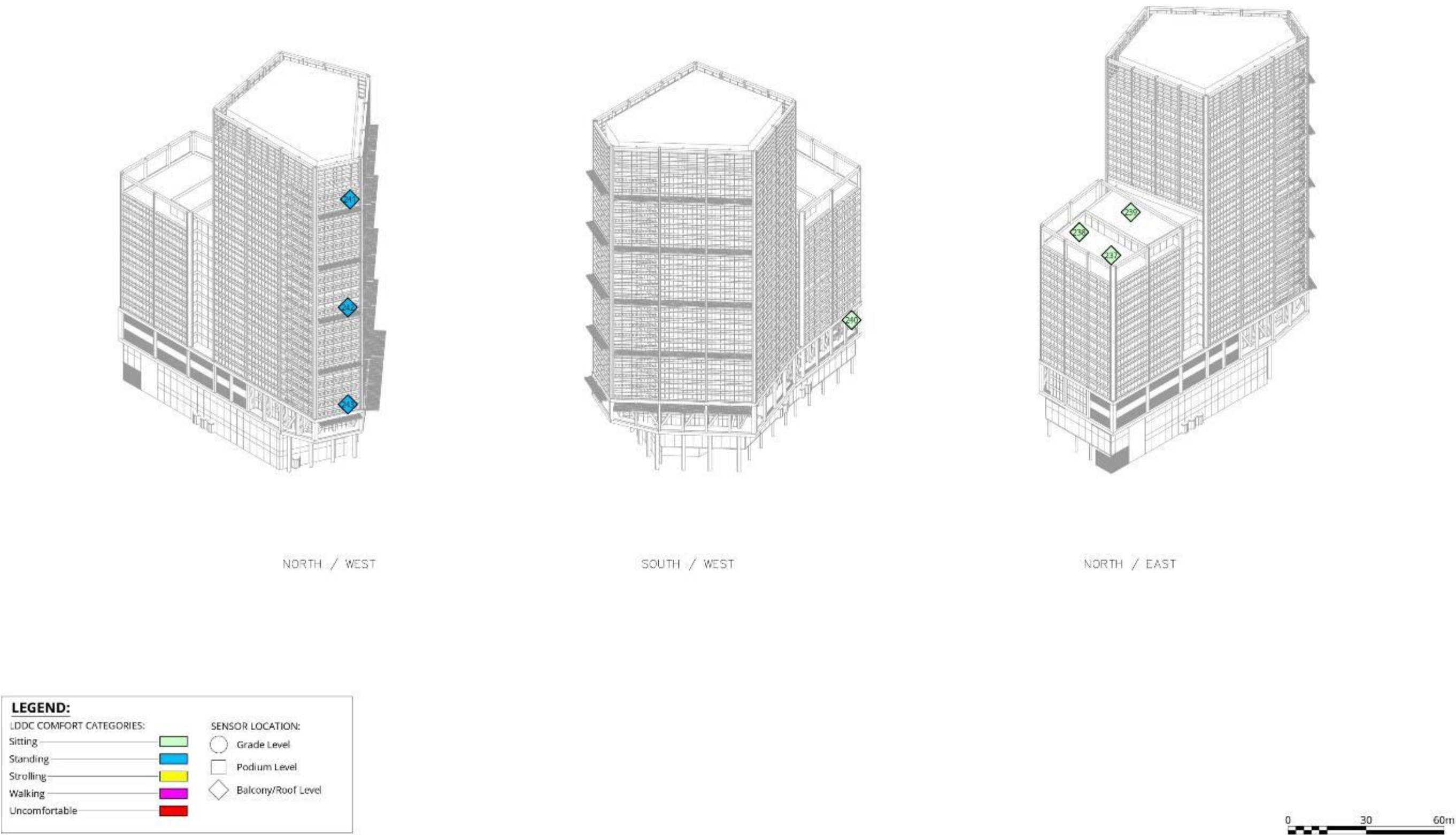


Figure 10.20 Revised Scheme with Landscaping, Wind Mitigation and Existing Surrounding Buildings – Summer Season, Platform Level





Figure 10.21 Revised Scheme with Landscaping, Wind Mitigation and Existing Surrounding Buildings – Summer Season, Terrace/Balcony Levels



# 10.9 COMPARISON OF THE 2015 PROPOSED DEVELOPMENT WITH THE 2019 REVISED SCHEME

10.9.1 The scheme was previously assessed in a different form by RWDI in 2014, in support of the 2015 ES. Since the 2015 Proposed Development was assessed there has been an overall reduction in height and change of distribution of the massing of a number of the buildings. Wind conditions at the current, Revised Scheme would be improved over the 2015 Proposed Development with the embedded wind mitigation measures and proposed landscaping scheme. With the 2015 Proposed Development conditions would be more likely to be windier to the north of the site and within the site boundary during the windiest season than the Revised Scheme, which would be windier to the west of the site. In both schemes there would be instances of strong winds with the potential to be a safety concern requiring the development of embedded wind mitigation measures and the proposed landscaping schemes. In both schemes, with the application of these measures there would be no significant residual effects.

# 10.10 SCOPE FOR ADDITIONAL MITIGATION MEASURES

10.10.1 Embedded wind mitigation measures would result in wind conditions at the Revised Scheme suitable for the intended pedestrian uses with no significant effects outstanding. As such no additional mitigation measures would be required to further improve the wind microclimate.

# 10.11 RESIDUAL EFFECTS

10.11.1 With wind mitigation measures and the proposed landscaping scheme detailed in 10.8.6 embedded in the Revised Scheme there would be no significant residual effects relating to wind microclimate.

# 10.12 CUMULATIVE EFFECTS

Construction Phase	
Embedded Mitigation Measures	
10.12.1	As discussed for the Revised Scheme with the existing surrounding buildings, during construction it is expected that site access will be restricted and hoarding will be in place around the site. As construction proceeds, wind mitigation measures detailed above for Revised Scheme with the existing surrounding buildings would be required to be applied in order to avoid windy conditions off-site.
Anticipated Effects	
10.12.2	During construction of the Revised Scheme, wind conditions would be expected to gradually adjust from those of the existing site with cumulative schemes, to those presented for the Completed Development in the context of the cumulative schemes (Configuration 4). Comparing the results presented for Configuration 3 and Configuration 4 it would be expected that cumulative schemes would not substantially change wind conditions around the Revised Scheme. As such, wind conditions at the existing site with cumulative schemes would be expected to be similar to those in the baseline scenario (Configuration 1).
10.12.3	As discussed for the Revised Scheme with the existing surrounding buildings, the wind environment during the construction of the Revised Scheme 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 Revised Scheme. As construction progresses, wind conditions adjusting to those presented for the operational development would represent a temporary negligible (not significant) effect. Strong winds exceeding 15m/s and 20m/s for 0.025% of the time (approximately two hours per year) at ground and podium level would be expected to occur on-site until installation of the proposed landscaping scheme and wind mitigation measures has been completed. The implementation of wind mitigation measures and the proposed landscaping scheme as construction progresses would be expected to reduce the occurrence of on- and off-site strong winds during the construction phase such that wind conditions would be suitable for the intended use.

## Anticipated Effects of Applying the Minimum Development Parameter

10.12.4 Wind conditions in the minimum development parameter scenario have been assessed qualitatively using the professional judgment of an experienced wind engineer. It would be expected that wind conditions would be generally similar to those presented for the construction phase of the maximum development parameter scenario of the Revised Scheme discussed above. Localised improvements in wind conditions may be expected, however, as the massing of the development remains similar, the range of conditions and likely occurrence of strong winds in the absence of embedded mitigation would remain likely.

## Operational Phase

### Embedded Mitigation Measures

10.12.5 As discussed for the Revised Scheme with the existing surrounding buildings (paragraph 10.8.9 – 10.8.16 and 10.8.25 – 10.8.27), mitigation measures were developed through iterative wind tunnel testing to enhance the effectiveness of the proposed landscaping scheme in reducing the occurrence of strong winds and improving wind conditions for pedestrians using the surrounding area and occupants of the site. The measures developed to improve wind conditions at the Revised Scheme in the context of the existing surrounding buildings would remain necessary for wind conditions to be as discussed below for the Revised Scheme with the cumulative surrounding buildings.

10.12.6 Without the application of these measures, wind conditions at the site and the surrounding area would be windier than suitable for the intended use with instances of strong winds which would be a safety concern for all pedestrians. Similarly, should changes be made to the Revised Scheme from that assessed for this chapter, wind conditions may be expected to be different from those discussed below.

## Anticipated Effects

### Configuration 4: Revised Scheme with Landscaping, Wind Mitigation and Cumulative Surrounding Buildings

10.12.7 Discussion of the wind conditions at the Revised Scheme with the cumulative surrounding buildings is based on results presented in **Figure 10.22** and **Figure 10.23** for the ground and podium levels respectively during the windiest season and **Figures 10.24** and **10.25** for the ground and platform levels respectively during the summer season, when amenity spaces are expected to be most frequently used. Wind conditions at terrace and balcony level would be expected to be similar to those in Configuration 3 and have therefore been assessed qualitatively.

10.12.8 Cumulative schemes considered within the assessment are based upon those presented in **Chapter 3: EIA Methodology, Table 3.9** those within a 360m radius from the centre of the site are included within Configuration 4 with the exception of schemes where construction has commenced.

10.12.9 Developments beyond a 360 m radius of the centre of the site would not be expected to modify the wind approaching the site substantially. The likely effects of developments beyond this radius have, however, been included within the analysis of the surrounding terrain detailed in 10.6.3.

### Pedestrian Comfort

10.12.10 Wind conditions at the Revised Scheme in the context of the cumulative surrounding buildings would range from suitable for sitting use to strolling use during the windiest season (**Figure 10.22**), similar conditions to those in Configuration 3, the Revised Scheme in the context of the existing surrounding buildings.

10.12.11 During the summer season, wind conditions at ground (**Figure 10.24**) and platform levels (**Figure 10.25**) would have conditions suitable for sitting and standing use. As during the windiest season, these conditions would be similar to those in Configuration 3.

### Thoroughfares

10.12.12 Wind conditions on on-site and off-site thoroughfares would be similar to those in Configuration 3 during the windiest season (**Figure 10.22**). Wind conditions at the junction of Wheler Street and Quaker Street would be suitable for strolling use, one category windier than in Configuration 3, but suitable for the intended pedestrian use. As such, wind conditions on on-site thoroughfares at both ground and platform level (**Figure 10.23**) would represent a negligible (not significant), minor beneficial (not significant) and moderate beneficial (not significant) effect and off-site thoroughfares would have conditions representing a negligible (not significant) effect.



Entrances

- 10.12.13 Entrance locations to the Revised Scheme at both ground and platform levels and to the surrounding buildings would be similar to those in Configuration 3, ranging from suitable for sitting to standing use during the windiest season (**Figure 10.22** and **Figure 10.23**). Wind conditions at on-site entrances would therefore represent a negligible (not significant) to minor beneficial (not significant) effect and off-site entrances would have conditions representing a negligible (not significant) effect.

Ground Floor Amenity Space

- 10.12.14 On-site ground floor amenity spaces on the south side of Sclater Street would have conditions suitable for sitting use and off-site amenity space on Sclater Street and Quaker Street would have conditions suitable for sitting use during the summer season (**Figure 10.24**), similar to those in Configuration 3. As such, these conditions would represent a negligible (not significant) effect on-site and a negligible (not significant) effect off-site.

Platform Level Amenity Space

- 10.12.15 Wind conditions at platform level would be suitable for sitting and standing use during the summer season (**Figure 10.25**), with standing use conditions between Buildings 2 and 8A and between Buildings 8A and 8B similar to Configuration 3. As in Configuration 3 these wind conditions would represent a negligible (not significant) effect.

Terrace and Balcony Level Amenity Space

- 10.12.16 Wind conditions on the Building 2 eastern roof terraces and balconies at the south-eastern corner of Building 2 would be expected be similar to those in Configuration 3 based on a comparison of the ground level results and the scale and proximity of the cumulative schemes to the Revised Scheme. As such, wind conditions would be anticipated to be suitable for sitting use, represent a likely negligible (not significant) effect during the summer season.
- 10.12.17 On the Building 2 western corner terraces, wind conditions have been assessed qualitatively, as above, and would be expected to be suitable for standing use during the summer season, one category windier than suitable for amenity use. Conditions on balconies would therefore represent a likely minor adverse (significant) effect.

*Strong Winds*

- 10.12.18 Wind mitigation measures and the proposed landscaping scheme embedded in the Revised Scheme (as listed in paragraph 10.8.6) would be effective at mitigating strong winds that would occur in the absence of these measures. As such, there would be no instances of strong winds exceeding 15m/s or 20m/s for more than 0.025% of the time (approximately two hours per year) at or surrounding the Revised Scheme.

Figure 10.22 Revised Scheme with Landscaping, Wind Mitigation and Cumulative Surrounding Buildings – Windiest Season, Ground Level

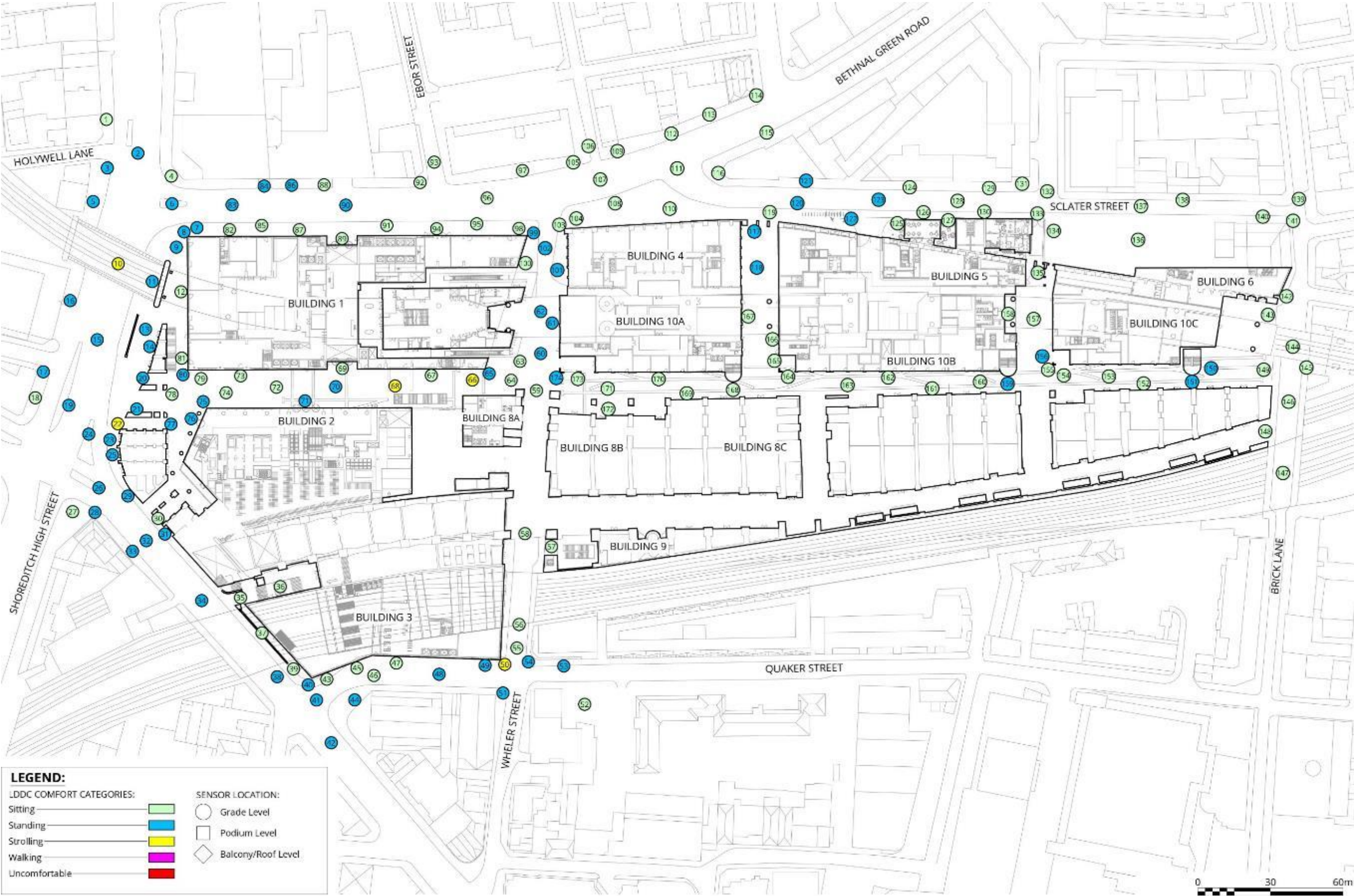




Figure 10.23 Revised Scheme with Landscaping, Wind Mitigation and Cumulative Surrounding Buildings – Windiest Season, Platform Level





Figure 10.24 Revised Scheme with Landscaping, Wind Mitigation and Cumulative Surrounding Buildings – Summer Season, Ground Level

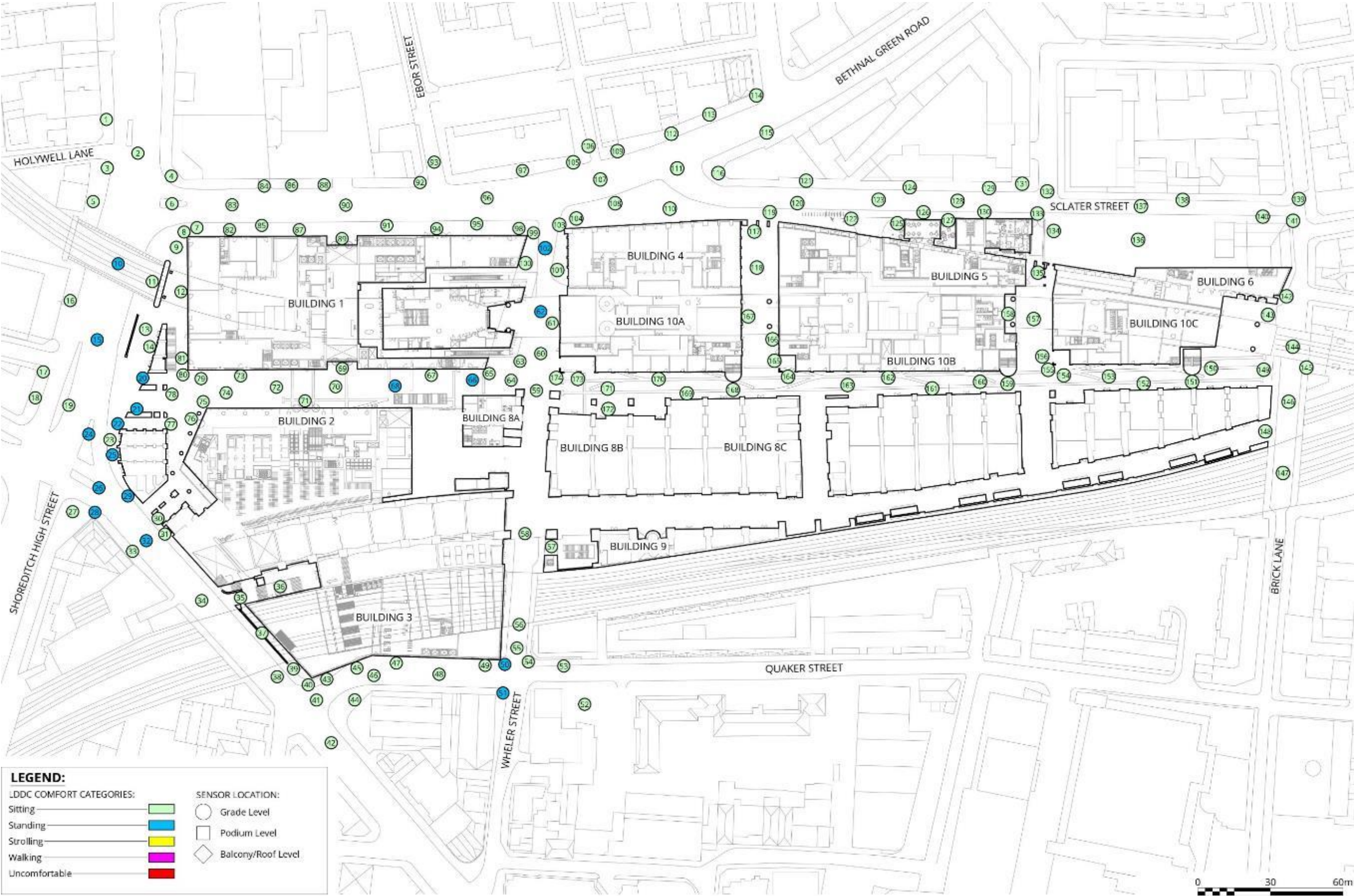
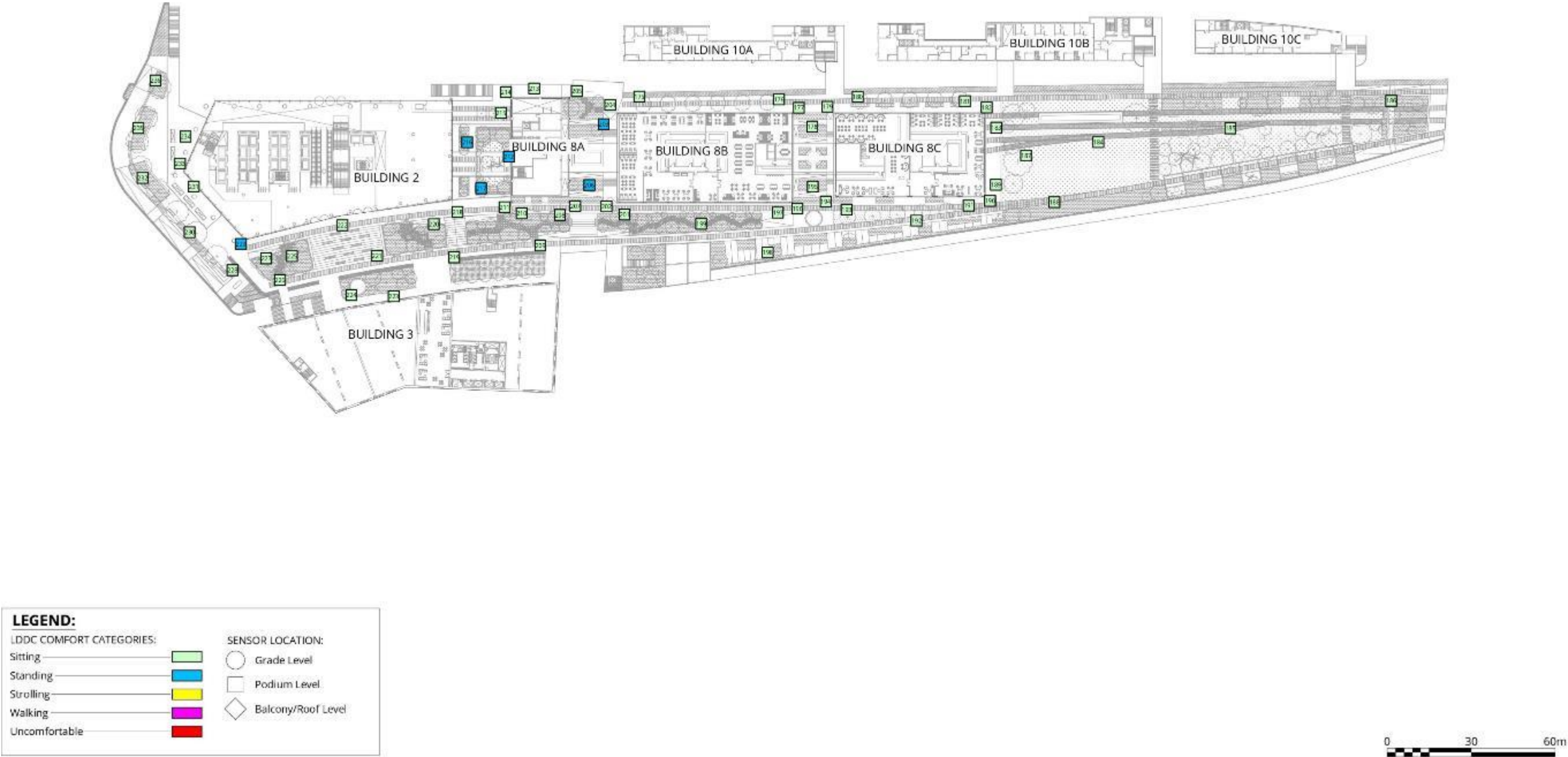




Figure 10.25 Revised Scheme with Landscaping, Wind Mitigation and Cumulative Surrounding Buildings – Windiest Season, Platform Level



# 10.13 SUMMARY AND CONCLUSIONS

10.13.1	Wind conditions at the site were assessed for four configurations: <ul style="list-style-type: none"><li>• Configuration 1: Existing site with the Existing Surrounding Buildings (Baseline);</li><li>• Configuration 2: Revised Scheme Buildings 2 and 7 with, Landscaping, Wind Mitigation and the Existing Surrounding Buildings (mid-construction scenario);</li><li>• Configuration 3: Revised Scheme with Landscaping, wind Mitigation and the Existing Surrounding Buildings (Full development); and</li><li>• Configuration 4: Revised Scheme with Landscaping, Wind Mitigation and the Cumulative Surrounding Buildings (Full development with Cumulative).</li></ul>
10.13.2	Wind tunnel data was combined with meteorological data for London collected from the meteorological stations at three London airports (Gatwick, Heathrow and Stansted). Based on this data, prevailing winds in the London area are from the southwest throughout the year, with an increase in winds from the northeast during the spring season.
10.13.3	Wind conditions have been assessed using the Lawson Comfort Criteria, which has been used to determine the suitability of a space for the intended use based on the time exceeding a given wind speed. The criteria sets out five categories of increasing activity level for which increasing wind speed would be tolerated. Lawson also specifies the assessment of strong winds which would have the potential to be a safety concern for pedestrians and cyclists when winds exceed 15m/s for more than 0.025% of the time (approximately two hours per year).
10.13.4	Wind conditions in Configuration 1 would be range from suitable for sitting to strolling use during the windiest season. At the existing site all thoroughfares, entrance locations and amenity spaces surrounding the site would have conditions suitable for the intended pedestrian use.
10.13.5	In order to eliminate strong winds and windy conditions at and surrounding the Revised Scheme iterative wind tunnel testing was used to develop the following embedded wind mitigation measures and enhance the proposed landscaping scheme: <ul style="list-style-type: none"><li>• A solid canopy above the transfer structure 6 m wide on the southwestern façade;</li><li>• Horizontal fins 3m wide protruding from floor levels 5, 10, 15 and 20 with a 1 m gap between fins;</li><li>• 11 elevated banners in staggered arrangement along thoroughfare to north of Plot 2 – 1.5m wide, 6m tall, approximately 50% porous medium 6m above ground suspended from poles;</li><li>• Baffles suspended from the underside of the Overground structure where this crosses pedestrian thoroughfares, 1.5m high in staggered arrangement;</li><li>• Dense planting or hedging at platform level west of Plot 2 running perpendicular from the local Building 2 elevation (in four radial strips) and following the eastern edge of the Oriel (single broken strip), 1.5m in height (including planter);</li><li>• Three deciduous trees east of the southwestern corner of Plot 2, 8m tall;</li><li>• Two planters with dense planting or hedging between south-eastern corner of Plot 2 and southwestern corner of Plot 8A, 1.5m total high;</li><li>• Solid screens in staggered arrangement between south-eastern corner of Plot 2 and southwestern corner of Plot 8A, 1.5m wide by 2m in height; and</li><li>• Solid balustrade around the Building 2 roof terraces, 1.8m in height.</li></ul>
10.13.6	It should be noted that the measures for the outline plots have been developed to demonstrate how a safe and comfortable environment can be provided, it is very likely that when these building come forward at reserved matter stage the wind environment will improve. This is due to the articulation of the facades and the likely reduction in the extent of the massing. Therefore, at reserved matter stage the Revised Scheme should be reassessed to identify whether these mitigation measures are still required.
10.13.7	With the embedded mitigation measures above incorporated the following conditions were reported.
10.13.8	Wind conditions in Configuration 2 would be suitable for sitting to strolling use during the windiest season. Wind conditions on thoroughfares to the west of the site would be windier than in the baseline scenario but would remain suitable for the intended use. All on- and off- site thoroughfares and entrance locations would have wind conditions suitable for the intended use during the windiest season. These conditions would represent a <b>negligible</b> (not significant) to <b>moderate beneficial</b> (not significant) effect on thoroughfares and a <b>negligible</b> (not significant) to <b>minor beneficial</b> (not significant) effect at entrance locations. During the summer season wind conditions at ground floor and platform level amenity spaces both on- and off-site would be suitable for the intended use. These conditions would represent a <b>negligible</b> (not significant) effect. Wind conditions on Building 2 balconies at the south-western corner and on the Building 2 eastern roof terrace would represent a negligible (not significant) effect. Wind conditions on the Building 2 western corner terraces would have conditions representing a minor adverse (significant) effect.
10.13.9	There would be no instances of strong winds in Configuration 2 with the embedded wind mitigation measures.

10.13.10	In Configuration 3, wind conditions would range from suitable for sitting to strolling use during the windiest season. On thoroughfares to the west of the site, conditions would be improved relative to Configuration 2, remaining suitable for the intended use. All on- and off-site thoroughfare and entrance locations would be suitable for the intended use during the windiest season, representing a <b>negligible</b> (not significant) to <b>moderate beneficial</b> (not significant) effect on thoroughfares and a <b>negligible</b> (not significant) to <b>minor beneficial</b> (not significant) effect at entrance locations. Within on- and off-site ground floor and platform amenity spaces, wind conditions would be suitable for sitting and standing use, acceptable conditions for the intended pedestrian uses. These conditions would represent a <b>negligible</b> (not significant) effect. Wind conditions on Building 2 balconies at the south-western corner and on the Building 2 eastern roof terrace would represent a negligible (not significant) effect. Wind conditions on the Building 2 western corner terraces would have conditions representing a minor adverse (significant) effect.
10.13.11	As in Configuration 2, with the embedded wind mitigation measures there would be no instances of strong winds in Configuration 3.
10.13.12	There would be no instances of strong winds and no residual significant effects in Configurations 2 or 3. As such no further wind mitigation measures would be required.
10.13.13	The introduction of the cumulative developments in Configuration 4 would not substantially change wind conditions from those in Configuration 3. As such wind conditions would remain suitable for the intended use on thoroughfares and at entrance locations during the windiest season. These conditions would therefore represent a <b>negligible</b> (not significant) to <b>moderate beneficial</b> (not significant) effect on thoroughfares and a <b>negligible</b> (not significant) to <b>minor beneficial</b> (not significant) effect at entrance locations. Similarly, during the summer season wind conditions would be similar to those in Configuration 3. As such, wind conditions would represent a <b>negligible</b> (not significant) effect within amenity spaces. Conditions on Building 2 balconies and roof terraces would be expected to remain similar to those in Configuration 3 and represent a likely negligible (not significant) effect at roof terrace level and south-eastern corner balcony locations and likely minor adverse (significant) effect on western corner terraces.
10.13.14	There would be no instances of strong winds in Configuration 4 with the embedded wind mitigation measures.
10.13.15	The scheme was previously assessed in a different form by RWDI in 2014. Since the 2015 Proposed Development was assessed there has been an an overall reduction in height and change of distribution of the massing of a number of the buildings. Wind conditions at the current, Revised Scheme would be improved over the 2015 Proposed Development with the embedded wind mitigation measures and proposed landscaping scheme. With the 2015 Proposed Development conditions would be more likely to be windier to the north of the site and within the site boundary during the windiest season than the Revised Scheme, which would be windier to the west of the site. In both schemes there would be instances of strong winds with the potential to be a safety concern requiring the development of embedded wind mitigation measures and the proposed landscaping schemes. In both schemes, with the application of these measures there would be no significant residual effects.
10.13.16	<b>Table 10.6</b> summarises the topic effects resulting from the Revised Scheme.



Table 10.6 Summary of Residual Effects

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Construction								
Existing Thoroughfare Users	High	Negligible	See paragraph 10.8.9 – 10.8.16 – to be applied as construction progresses	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Temporary				
				Likely				
Existing Entrance Users	High	Negligible	See paragraph 10.8.9 – 10.8.16 – to be applied as construction progresses	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Temporary				
				Likely				
Existing Amenity Space Users	High	Negligible	See paragraph 10.8.9 – 10.8.16 – to be applied as construction progresses	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Temporary				
				Likely				
On-site Construction Workers	High	Negligible	See paragraph 10.8.9 – 10.8.16 – to be applied as construction progresses	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Temporary				
				Likely				
Operation Plots 2 and 7								
On-site Thoroughfare Users	High	Negligible to Moderate	See paragraph 10.8.9 – 10.8.16	High	Beneficial	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
				Likely				
Off-site Thoroughfare Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
				Likely				
On-site Entrance Users	High	Negligible to Minor	See paragraph 10.8.9 – 10.8.16	High	Beneficial	None	Beneficial	Minor
				Direct				
				Local				
				Permanent				
				Likely				
	High	Negligible		High	Negligible	None	Negligible	Negligible

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Off-site Entrance Users			See paragraph 10.8.9 – 10.8.16	Direct Local Permanent Likely				
Off-site Bus Stop Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High Direct Local Permanent Likely	Negligible	None	Negligible	Negligible
Off-site Ground Level Amenity Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High Direct Local Permanent Likely	Negligible	None	Negligible	Negligible
On-site Platform Level Amenity Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High Direct Local Permanent Likely	Negligible	None	Negligible	Negligible
Building 2 Terrace / Balcony Amenity Space	High	Minor to Negligible	See Paragraph 10.8.9 – 10.8.16	High Direct Local Permanent Likely	Adverse	None	Adverse	Minor
<b>Operation</b>								
On-site Thoroughfare Users	High	Negligible to Moderate	See paragraph 10.8.9 – 10.8.16	High Direct Local Permanent Likely	Beneficial	None	Negligible	Negligible
Off-site Thoroughfare Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High Direct Local Permanent Likely	Negligible	None	Negligible	Negligible
On-site Entrance Users	High	Negligible to Minor	See paragraph 10.8.9 – 10.8.16	High Direct Local Permanent Likely	Beneficial	None	Beneficial	Minor



Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Off-site Entrance Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
				Likely				
Off-site Bus Stop Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
				Likely				
On-site Ground Level Amenity Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
				Likely				
Off-site Ground Level Amenity Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
				Likely				
On-site Platform Level Amenity Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
				Likely				
Building 2 Terrace / Balcony Amenity Space	High	Minor to Negligible	See Paragraph 10.8.9 – 10.8.16	High	Adverse	None	Negligible	Minor
				Direct				
				Local				
				Permanent				
				Likely				
Cumulative Effects - Construction								
Existing Thoroughfare Users	High	Negligible	See paragraph 10.8.9 – 10.8.16 – to be applied as construction progresses	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Temporary				
				Likely				
Existing Entrance Users	High	Negligible	See paragraph 10.8.9 – 10.8.16 – to be applied as construction progresses	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Temporary				

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
				Likely				
Existing Amenity Space Users	High	Negligible	See paragraph 10.8.9 – 10.8.16 – to be applied as construction progresses	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Temporary				
				Likely				
On-site Construction Workers	High	Negligible	See paragraph 10.8.9 – 10.8.16 – to be applied as construction progresses	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Temporary				
				Likely				
Cumulative Effects - Operation								
On-site Thoroughfare Users	High	Negligible to Moderate	See paragraph 10.8.9 – 10.8.16	High	Beneficial	None	Negligible	Moderate
				Direct				
				Local				
				Permanent				
				Likely				
Off-site Thoroughfare Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
				Likely				
On-site Entrance Users	High	Negligible to Minor	See paragraph 10.8.9 – 10.8.16	High	Beneficial	None	Beneficial	Minor
				Direct				
				Local				
				Permanent				
				Likely				
Off-site Entrance Users	High	Negligible	See paragraph 10.8.9 – 10.16	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
				Likely				
Off-site Bus Stop Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				
				Permanent				
				Likely				
On-site Ground Level Amenity Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	High	Negligible	None	Negligible	Negligible
				Direct				
				Local				



Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Off-site Ground Level Amenity Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	Permanent	Negligible	None	Negligible	Negligible
				Likely				
				High				
				Direct				
				Local				
On-site Platform Level Amenity Users	High	Negligible	See paragraph 10.8.9 – 10.8.16	Permanent	Negligible	None	Negligible	Negligible
				Likely				
				High				
				Direct				
				Local				
Building 2 Terrace / Balcony Amenity Space	High	Minor to Negligible	See Paragraph 10.8.9 – 10.8.16	Permanent	Adverse	None	Adverse	Minor
				Likely				
				High				
				Direct				
				Local				

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