North Quay Volume 1: Environmental Statement Main Report

Chapter 12: Wind Microclimate



WIND MICROCLIMATE		
AUTHOR	IOR RWDI	
SUPPORTING APPENDIX	ES Volume 3: Appendix: Wind Microclimate PPORTING APPENDIX Annex 1: Legislative and Planning Context; and Annex 2: Pedestrian Level Wind Microclimate Assessment.	
 The creation of undesirable wind speeds (resulting in effects to ped and safety) at ground level within the Site, around buildings surroundir within nearby areas of off-site public open space during the enabling a works; and The creation of undesirable wind speeds at ground level (specific entrances, pedestrian thoroughfares, and within amenity spaces with c within the Site, at the balcony, terrace, and roof levels of the Proposed around buildings surrounding the Site, and within nearby areas of off-site public open space during the enabling a works; and 		
CONSULTATION The EIA Scoping Opinion subsequent discussions (ES Volume 3, Append Introduction and EIA Methodology, Annex 4) confirmed acceptability of the scop and method proposed for the Wind Microclimate assessment. This includes the assessment of the baseline wind conditions through wind tunnel testing, as well as the impact Proposed Development in the context of both the existing and cumulative buildings. The assessment scenarios include both the Maximum Parameter Model ar the Illustrative Scheme. Approximately thirty years of wind data were obtained fro London Heathrow Airport and London City Airport and adjusted to the Site.		

ASSESSMENT METHODOLOGY

Outline Application Methodology

- 12.1 This ES chapter assesses the wind conditions resulting from the Maximum Development Parameters Scenario ('Scenario 1 - The Maximum Development Parameters' as set out in ES Volume 1, Chapter 2: EIA Methodology), comprising maximum Development Plot heights and massing, i.e. the 'jelly mould'.
- **12.2** The Maximum Parameter Model of the Proposed Development (without any landscaping) created from the Maximum Development Parameters Scenario represents the worst-case scenario for assessment. The maximum massing of the Proposed Development without landscaping is expected to divert the biggest volume of winds around the scheme and will typically result in the worst-case wind microclimate impacts, particularly off-site.
- 12.3 In addition, the Indicative Scheme model of the Proposed Development which includes proposed landscaping scheme has been assessed (Scenario 5, as set out in ES Volume 1, Chapter 2: EIA Methodology). The Indicative Scheme provides architectural details (such as recessed entrances, parapets, balustrades etc.) which fundamentally affect the aerodynamics of buildings and this would be expected to be more representative of the eventual detailed scheme which could come forward through RMA's. Assessment of the Indicative Scheme also allows for locations to be referenced to a target use of the Site (i.e. entrances, amenity space, thoroughfares etc.) which is a key component of wind microclimate assessments, and provides a scenario representative of the likely on-site wind microclimate. By undertaking an assessment of the Indicative Scheme, it demonstrates that a detailed scheme could come forward within the parameters sought for approval, which would work from a wind perspective.
- Testing the Maximum Parameter Model of the Proposed Development and an Indicative Scheme provides a 12.4 robust assessment of the worst range of possible wind conditions on-site (being the Maximum Parameter

which no landscaping has been proposed.

12.5 The detailed wind mitigation strategy would be tested at the RMA stage as relevant and more specific detailed phase of development.

Defining the Baseline

Current Baseline Conditions

- **12.6** The baseline conditions across the existing Site (with the existing surrounding buildings) have been defined using wind tunnel testing to provide a detailed, quantitative assessment.
- 12.7 considered a large enough scale to ensure all wind effects are captured.
- 12.8 Volume 3, Appendix: Wind Microclimate.
- 12.9 Surrounding Buildings' (also referred to as the 'Baseline Scenario').

Evolution of the Baseline

- **12.10** No cumulative schemes with, or submitted for, planning approval are located within the 360m radius covered conditions on-site.
- **12.11** It has been noted that there is a potential future development that would fall within the 360m radius of the

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Model of the Proposed Development due to the larger overall massing diverting large volumes of air and denerating the most adverse wind conditions off-site) with a more realistic scenario (the Indicative Scheme). Mitigation is only conducted on the Indicative Scheme as it provides a more realistic representation of the real wind conditions when the Proposed Development comes forward. Mitigating the Maximum Parameter Model scheme would not be reasonable and would result in unnecessarily large measures which could be unfeasible and unrealistic; this would not be representative of a scheme which could be developed and for

mitigation would be developed if required and be part of the design/landscaping of each specific future

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). The mean and peak wind speeds have been measured 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 a 360m radius of the Site which is

The results have been combined with long-term meteorological climate data for the London area (London Heathrow Airport and London City Airport). The meteorological data used in this assessment is deemed to be representative of the local wind microclimate for the London area. The meteorological data used is presented within the 'Baseline Condition - Meteorological Data' section and shown as a 'wind rose' in ES

The baseline conditions are reflected within the wind scenario - 'Configuration 1: Existing Site with Existing

by the wind tunnel model. As a result, the wind tunnel testing did not include configurations to assess the impact of the introduction of future surrounds. As such, the baseline has not been considered to have an evolution in this assessment and is expected to remain as presented in the Baseline Scenario. Additionally, any cumulative schemes outside of this range are not expected to have a significant impact on the wind

wind tunnel model. The potential future development is referred to as "New City College Poplar Campus" and currently only has an EIA Scoping Report submitted (PA/20/00137). The potential future development would be positioned north of the Site on the northern side of Poplar Railway Station. Given the current status and lack of available detail of this potential future development, it has not been included within this assessment. However, the potential impact of the introduction of the "New City College Poplar Campus" has been qualitatively assessed in this section.

Impact Assessment Methodology

Enabling and Construction

12.12 The potential microclimate impacts during enabling and construction works have not been directly assessed within the wind tunnel, as this is a temporary condition and would be highly variable as the remaining existing buildings are dismantled and the Proposed Development is constructed in phases. The potential impacts are assessed using the professional judgement of an experienced wind engineer, based on an assessment of the background wind climate at the Site (the results of the tested configurations for the baseline and completed Proposed Development scenarios) and an understanding of the likely effects based on RWDI's experience of assessing wind in the built environment.

Phasing

- **12.13** Phasing of the Proposed Development has not been modelled within the wind tunnel and therefore the wind conditions during the intermediate phases (from existing Site to completed Proposed Development) have not been quantitatively assessed. Wind conditions at the Proposed Development have been quantitatively assessed for the completed and operational development only as this would be expected to be the worst case (i.e. windiest) scenario. Wind conditions during the construction phases have been assessed qualitatively as detailed above based on the expected change in wind conditions between the existing Site and the completed Proposed Development.
- 12.14 In addition, the wind conditions around each phase of the Proposed Development will be assessed with further wind tunnel testing during the RMA stage of each phase. With further wind tunnel testing during the RMA stage, the wind microclimate of the phased construction will be modelled in detail at this time. Wind conditions are not expected to significantly change for the RMA assessment and specific mitigation measures will be developed for any windier than desired areas if highlighted during the RMA assessments.

Completed Development

- 12.15 To predict the local wind environment associated with the completed Proposed Development, and the resulting pedestrian comfort within and immediately surrounding the Site, wind tunnel testing of the Proposed Development has been undertaken for both the Maximum Parameter Model (comprising maximum building massing including maximum heights and Development Plots) and the Indicative Scheme.
- **12.16** The Maximum Parameter Model has been wind tunnel tested in the context of the existing surrounding buildings with no landscaping in place, as a worst case scenario. For a more realistic and robust assessment wind conditions around the Indicative Scheme in the context of the existing surrounding buildings has also been tested with the indicative landscaping scheme in place, and a wind mitigation strategy has been developed for this scenario only as it is more representative of expected wind conditions.

- 12.17 Wind tunnel testing is considered the most well-established and robust means of assessing the pedestrian accordance with the widely accepted Lawson Comfort Criteria¹.
- reported when they occur.

Assumptions and Limitations

- environment has not been considered further, as agreed with LBTH.
- Volume 3, Appendix: Wind Microclimate.
- 12.21 The wind microclimate assessment is based upon historical meteorological data for London Heathrow Airport

Wind Tunnel Model

- **12.22** To produce the results within the wind tunnel, a 1:300 scale model comprising the Site and the surrounding diameter disc allow for the surrounding area within a 360 m radius of the centre of the Site modelled.
- **12.23** To test the impact of the Proposed Development, a scale model of the buildings comprising the completed Surrounding Buildings and the Indicative Landscaping Scheme).

Test Configurations

- - Configuration 1: The Existing Site with Existing Surrounding Buildings;

wind microclimate. It enables the pedestrian wind microclimate at a site to be quantified and classified in

12.18 The wind tunnel tests deliver a detailed assessment of the mean and gust wind conditions around the Site and the Proposed Development for all wind directions in terms of pedestrian comfort. Strong winds are also

12.19 The effects of construction equipment, such as cranes or other temporary structures, have not been assessed. Construction equipment is expected to have localised and temporary effect on the wind conditions around the Site; it is assumed that there will be no access to pedestrians during the construction phases; the enabling and construction works are less sensitive to the local wind conditions than when the Proposed Development in complete and operational; therefore the impact of construction equipment on the on-site wind

12.20 The wind tunnel model included the surrounding buildings and all relevant features with regards to wind flow, up to 360m from the centre of the Site. A photograph of the wind tunnel model (Indicative Scheme) is shown in Figure 12.1; more photographs (including the Maximum Parameter Model) are included within the ES

and London City Airport that have been adjusted to the terrain exposure of the Site. The selection of measurement locations covers the ground, terrace, balcony, and roof levels across the Site, in areas where adverse wind conditions could be expected and in areas designed for more inactive pedestrian use. The wind conditions for all wind directions are considered in the assessment with 36 wind directions at 10° increments.

area (including relevant existing buildings and other topographical features) was constructed on a 2.4m

Proposed Development has been constructed in its maximum parameter massing (Configuration 2: The Maximum Parameter Model of the Proposed Development with Existing Surrounding Buildings) and Indicative Massing (Configuration 3: The Indicative Scheme Model of the Proposed Development with Existing

12.24 The assessment of the wind microclimate is based on the results from a series of tests of physical models within the wind tunnel to provide a detailed, quantitative assessment. The configurations tested are as follows:

¹ Lawson, 2001. Building Aerodynamics. Imperial College Press.

- Configuration 2: The Maximum Parameter Model of the Proposed Development with Existing Surrounding Buildings;
- Configuration 3: The Indicative Scheme Model of the Proposed Development with Existing Surrounding • Buildings and the Indicative Landscaping Scheme; and
- Configuration 4: The Indicative Scheme Model of the Proposed Development with Existing Surrounding • Buildings, the Indicative Landscaping Scheme, and Indicative Wind Mitigation Measures.

Assessment Criteria

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Lawson Comfort Criteria

- **12.25** The assessment of the wind conditions requires a 'standard' against which to benchmark the microclimate. The Lawson Comfort Criteria have been established for some thirty years and have been widely used on building developments across the UK.
- 12.26 The Lawson Comfort Criteria (set out in Table 12.1) define a range of pedestrian activities from sitting through to more transient activities such walking along a thoroughfare; for each activity, a threshold wind speed and frequency of occurrence beyond which the wind environment would be unsuitable for the stated activity is defined.
 - Figure 12.1 Model of the Wind Tunnel Model in Configuration 3 (Indicative Scheme) in the Wind Tunnel (View from North).



Table 12.1 Lawson Comfort Criteria.

Colour	Comfort Category	Wind Speed	
	Uncomfortable	>10 m/s	Winds of this and wind miti
	Walking	8-10 m/s	Relatively hig walk, run or c
	Strolling	6-8 m/s	Moderate bre centre street,
	Standing	4-6 m/s	Gentle breeze points and bu
	Sitting	0-4 m/s	Light breezes one can read

Target Wind Conditions

General Use

- 12.27 For a mixed-use urban site, such as the Proposed Development (and surrounding area), the desired wind microclimate would typically need to have areas suitable for sitting, standing, and strolling.
- 12.28 Wind conditions classified as acceptable for walking, although not desirable, could be acceptable for would be expected to be 'walking with purpose'.

Amenity Areas and Balconies

- **12.29** The target conditions in seating areas is a wind microclimate that is suitable for sitting in the summer season would expect to be able to sit comfortably in the summer season.
- **12.30** A mix of wind conditions suitable for sitting and standing use during the summer season could be considered
- **12.31** Balcony locations would tolerate standing or calmer conditions in the summer as these are private amenity by the inclusion of the Proposed Development.

Entrances

12.32 Near building entrances, a wind environment suitable for standing or calmer is required, as pedestrians will entrances, therefore, focuses on the windiest season results.

Descriptor

magnitude are considered a nuisance for most activities, gation is typically recommended.

h wind speeds that can be tolerated if the objective is to cvcle without linaerina.

eezes that would be appropriate for strolling along a city/town plaza or park.

es suitable for main building entrances, pick-up/drop-off us stops.

desired for outdoor restaurants and seating areas where I a paper or comfortably sit for long periods.

sidewalks and pathways where pedestrians are not expected to linger, in other words, where pedestrians

(June, July, August). This is because these areas are more likely to be frequently used by pedestrians who

acceptable for large mixed-use amenity spaces, including both public realm and private communal areas. However, designated seating areas would require sitting use wind conditions during the summer season.

areas and designated seating areas are typically not provided. Measurements have been taken at the most representative balcony locations such as corner balconies, as the wind conditions at these balconies are expected to be windier than balconies located in the middle of the facade; each balcony measurement location is representative of the wind conditions at the balconies in the immediate surroundings. Wind conditions at balcony and terrace locations of the existing surrounding buildings are not expected to be significantly affected

transition from the calm indoors to the windier outdoors throughout the year. The assessment of building

12.33 Fire escapes, maintenance entrances, and back of house entrances, with wind conditions suitable for strolling would be considered suitable (in terms of comfort). This is considered acceptable as these secondary entrances would not be used as frequent as main entrances.

Railway Station Platforms

Target wind conditions at railway platforms would be suitable for standing use wind conditions during the windiest season. The assessment of railway station platforms therefore focuses on the windiest season results.

Roads

12.34 Wind conditions within road locations should be suitable for walking use or calmer during the windiest season. The assessment of road locations therefore focuses on the windiest season results.

Crossinas

12.35 Wind conditions at crossing locations should be suitable for walking use or calmer during the windiest season. The assessment of crossings therefore focuses on the windiest season results.

Thoroughfares

- **12.36** A pedestrian thoroughfare should be suitable for strolling during the windiest season. The assessment of pedestrian thoroughfares therefore focuses on the windiest season results.
- **12.37** Localised occurrence of walking conditions may be tolerable in areas with limited footfall, or service areas, provided that the strong wind criteria (described below) are not exceeded. Walking conditions would be tolerable on a thoroughfare only if there is no reason for a pedestrian to linger, such as in the middle of a road crossing. Otherwise, the target condition would be strolling use wind conditions.

Waterwavs

- 12.38 As requested through the Scoping Opinion by Canal and River Trust, wind conditions are also considered in the waterways with regards to potential effects on navigation of vessels.
- **12.39** No criteria for this has been established within the industry, considering the variance in factors that would determine whether navigation could or would be affected - i.e. size and power of the vessel, experience of the crew etc. As such, conditions are quantified as per the Lawson Comfort Criteria to provide an indication of the change in wind environment (where applicable) and no effect criteria or significance is applied.

Strong Winds

- **12.40** The assessments undertaken also provide a notification of stronger winds as specified by the Lawson Criteria. which are defined as wind speeds in excess of 15m/s for more than 0.025% of the time (approximately two hours of the year). Strong winds are assessed on an annual basis; however, the greatest proportion of the total can typically be attributed to the windiest season (normally winter in the UK).
- **12.41** Exceedance of the 15m/s threshold indicates a safety issue for certain members of the population and the need for remedial measures and careful assessment of the expected use of the location in question; e.g. is it reasonable to expect elderly or very young pedestrians to be present at the location on the windiest day of the year? Wind speeds that exceed 20m/s for more than 0.025% of the time (approximately two hours of the

year) represent a safety issue for all members of the population, which would require mitigation to provide an appropriate wind environment.

require mitigation to reduce the frequency of, or even eliminate, strong winds.

Methodology for Defining Effects

Receptors and Receptor Sensitivity

- effect) for all receptors.
- locations to the categories in each configuration tested is as follows:
 - On-site:
 - Development:
 - Entrances: includes entrances on the ground and upper levels;
 - levels as well as balconies;
 - Crossings, maintenance areas, railway platforms, roads, etc.
 - Off-site:
 - All receptors falling outside the definition of the boundary of the Site.
- **12.45** More detail on the receptors can be found in Tables 12.3 and 12.4.

Magnitude of Impact

mitigation, regardless of location.

Defining the Effect

12.42 Strong winds are generally associated with areas with wind conditions which would be classified by the Lawson Comfort Criteria as 'walking' or 'uncomfortable'; however, they are occasionally concurrent with areas acceptable for 'strolling' use. In a mixed-use urban development, 'walking' and 'uncomfortable' conditions would not usually form part of the 'target' wind environment in terms of pedestrian comfort and would usually

12.43 The sensitivity of a receptor at the Site in the presence of the Proposed Development is high and equal for all measurement locations. This is because the significance criteria for the wind assessment are based on whether the wind environment of the Site is acceptable for the intended use. As such, an equal sensitivity is assigned to each receptor within and surrounding the Proposed Development; as well as to receptors located around the surrounding context, where many of the same probe locations have been used. The geographical extent of the wind microclimate is expected to be within the Site and its immediate surroundings (i.e. a local

12.44 The following description of receptor categories for the Site and the approach taken to the allocation of probe

- Thoroughfares: includes areas that are immediately adjacent to the Proposed Development (i.e. within 5m of the building line). This also includes thoroughfares within the Proposed

- Amenity areas: includes designated seating areas, play areas, etc. on the ground and upper

12.46 The magnitude of impact for all receptors are defined as high. The impact of all receptors is the same, as any measurement location which has wind conditions windier than required for the intended use will require

12.47 The criteria used in the assessment of both potential and residual effects is based upon the relationship between the desired pedestrian use of an area of the Proposed Development (based on the categories defined by the Lawson Comfort Criteria) and the predicted wind conditions in that area. This also allows for

the assessment to account for any change in pedestrian activity that might arise because of the Proposed Development.

- **12.48** In terms of the nature of the effect, effects can either be Beneficial (calmer conditions than required), Adverse (windier conditions than required), or Negligible (similar conditions to those required).
- 12.49 A seven-point scale has been used within this assessment to assess the nature of effects, as shown in Table 12.2.
 - Table 12.2 Scale and Nature of Effect Criteria.

Recorded Wind Conditions	Significance of Effect
Wind Conditions are 3-steps calmer than desired	Major Beneficial
Wind Conditions are 2 steps calmer than desired	Moderate Beneficial
Wind Conditions are 1 step calmer than desired	Minor Beneficial
Wind Conditions are similar to those desired	Negligible
Wind Conditions are 1 step windier than desired	Minor Adverse
Wind Conditions are 2 steps windier than desired	Moderate Adverse
Wind Conditions are 3 steps windier than desired	Major Adverse

- **12.50** For wind, the duration of effects has been defined as follows:
 - Short term: up to five years;
 - Medium term: five to ten years; and
 - Long term: more than ten years.
- **12.51** All effects during the construction works are direct, local and short-term (temporary).
- **12.52** All effects once the Proposed Development is completed are direct, local and long-term (permanent) unless there is a change in the Proposed Development's massing on the Site or the local wind microclimate.

Categorising Likely Significant Effects

12.53 Strong winds (affecting pedestrian safety) are not included within this scale of effect assessment but are reported separately as any strong wind exceedance is significant and cannot be scaled to minor/moderate/major. Where strong winds occur, mitigation is required.

On-Site Results

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- **12.54** The adopted scale and nature of effects criteria (shown in Table 12.2) is a logical comparison of the measured wind environment with the desired wind environment. An adverse effect implies that a location has wind conditions that are unsuitable for the intended use. It should be noted that all Adverse effects are considered significant and would, therefore, require mitigation; Beneficial effects are not considered 'significant' and therefore do not require mitigation.
- 12.55 The minor, moderate, and major categories (scale of effect criteria, as shown in Table 12.2) indicate the severity of the difference between the desired microclimate and the measured microclimate. As an example, if the desired wind conditions at a location are required to be suitable for standing, but the predicted wind

conditions are suitable for strolling, then the difference between the desired and predicted wind conditions is one category windier than desired. In this case, the effect would be identified as Minor Adverse. Any Adverse effect would be considered 'significant', because it implies that an area has wind conditions that are unsuitable for the desired use of that area.

Off-Site Results

- **12.56** Based on the results of the wind tunnel testing and taking the baseline conditions into consideration, the likely effect at locations off-site have also be determined.
- **12.57** Should an off-site location be windier than required for the intended use with the Proposed Development in Nealiaible effect.
- 12.58 Off-site locations can only be deemed to have a Beneficial effect if the wind conditions have been made better Negligible effect.
- **12.59** If off-site wind conditions have been made worse because of the Proposed Development, but still acceptable will be made clear in the assessment.
- 12.60 Where wind conditions are suitable for the intended use in the baseline (existing) scenario and become scaled according to Table 12.2 as well as being deemed 'significant'.

BASELINE CONDITIONS

Current Baseline Conditions

Meteorological Data

12.61 The UK Meteorological Office supplies records of the number of hours that wind occurs for ranges of wind wind microclimate for the wider London area.

Configuration 1: The Existing Site with Existing Surrounding Buildings

12.62 Wind tunnel results for Configuration 1 are presented in Figure 12.2 and Figure 12.3 for the windiest and summer seasons, respectively.

Pedestrian Comfort

that would be suitable for walking use.

situ, but these wind conditions also occur in the baseline (existing scenario), then this would represent a

because of the Proposed Development, to become suitable for the intended use. This means, if the wind conditions are calmer than required in both the baseline and the complete and operational Proposed Development scenarios but are altered by the Proposed Development, then this would still represent a

for the intended pedestrian use, this would also represent a Negligible effect, but the change in conditions

windier than required with the Proposed Development in situ, the nature of effect is considered Adverse and

speed (using the Beaufort Scale) and by direction. Combined meteorological data for London Heathrow Airport and London City Airport (referred together as 'London Combined') provide a representation of the local

12.63 During the windiest season (Figure 12.2), the wind conditions would be mostly suitable for sitting, standing, and strolling use. There would also be a couple of areas (receptor locations 313 and 424) with wind conditions

- 12.64 During the summer season (Figure 12.3), the wind conditions would be suitable for sitting, standing, and strolling use.
- **12.65** The wind conditions in Configuration 1 were assessed devoid of existing landscaping.

Waterways

12.66 Wind conditions at the waterway locations 304-307, 309, 310 would be suitable for a mixture of sitting use (304-306) and standing use (307, 309, 310) conditions during the windiest season. These conditions establish a baseline for comparison in Configurations 2 and 3.

Figure 12.2 Configuration 1: Wind Conditions around the Existing Site with Existing Surrounding Buildings during the Windiest Season – Ground Level

6 \bigcirc 5 (411) 699 402 8 @3^{@0} @0 ASPEN WAY 410 404 405 408 (40) (40) (40) (412) (13) (417) (426) (416) (414) (41 (18) 379 4 (72) 620 871 <mark>312</mark> 623 311 (436) (32) 370 657 869 667 863 868 3 606 665 666 (19) 805 304 (17) (16 803 (13) (12) 9 10 FISHERMANS WALK LEGEND: LDDC COMFORT CATEGORIES: SENSOR LOCATION: Sitting- \bigcirc Ground Level Standing Podium Level Strolling Balcony/Roof Level $\langle \rangle$ Walking 11 Uncomfortable

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Strong Winds

12.67 Safety exceedances are presented in Figure 12.4. There would be exceedances of the 15m/s safety limit in limit or the 20m/s safety limit.

one area (receptor location 313). Otherwise, there are no other areas with exceedances of the 15m/s safety





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RECEPTORS AND RECEPTOR SENSITIVITY

Existing

12.68 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 Site include all pedestrians using or visiting the Site and the surrounding areas, as well as pedestrians and cyclists on surrounding thoroughfares, entrances to the surrounding buildings and surrounding amenity spaces.

Introduced

- **12.69** Receptors were installed across the Site and surrounding area up to a total of 439 receptor locations. The locations of the receptors are fixed and have been subjectively determined based on examination of architectural drawings, reflecting the use of the Proposed Development and surrounds. The receptor locations have been described for Configuration 2 and Configuration 3, separated into on and off-site, in Tables 12.3 and 12.4, respectively. The intended uses at each location are graphically depicted in Figures 47-51 of the technical appendix, ES Volume 3, Appendix: Wind Microclimate - Annex 2.
- **12.70** Note that for the Maximum Parameter Model of the Proposed Development (comprising maximum building massing including maximum heights and Development Plots), all receptor locations close to the facades would have the potential to be entrances and are therefore assumed as such to ensure a worst-case assessment of these potentially sensitive areas. Similarly, all roofs are assumed to be amenity spaces. Amenity spaces at ground level are represented in Configuration 2 by measurement locations 337, 349, 350, 353-355, 410, and 411; ground amenity areas are represented in Configurations 3 and 4 are represented by measurement locations 35, 46, 60, 72-76, 88, 96, 109, 110, 156, 158, 160, 162, 165, and 166.
- 12.71 A few receptors representing the railway station platforms (considered as off-site locations in this assessment as they are on an elevated platform above ground level and will not be altered in anyway by the Proposed Development and therefore the existing conditions as a railway platform will remain throughout construction and completion of the Proposed Development) in Configurations 1 and 2 (311, 312, 314, 315, 423, and 424) are represented by measurement locations 29, 28, 31, 33, 100, and 99 in Configurations 3 and 4.
- **12.72** A new potential cycle route would be included at the north of the Site, between the Proposed Development's buildings and Aspen Way.

Table 12.3 Receptors of Configuration 2: The Maximum Parameter Model of the Proposed **Development with Existing Surrounding Buildings.**

	Receptor	Receptor Reference (Probe Location Number)	
ĺ	On-site (Configuration 2)		
_	Roads (walking - windiest)	368, 369, 372, 376, 378, 384.	
	Thoroughfares (strolling - windiest)	308, 313, 317, 318, 322, 358, 390, 391, 393, 394, 408, 412, 413, 416, 417, 418, 419.	

Receptor	
Pedestrian Crossing Waiting Areas (standing - windiest)	
Ground Level Entrances (standing - windiest)	316, 319, 320, 321, 323- 374, 380-383, 387, 38
Ground Level Public Amenity Space Standing Areas	
(standing - summer)	
Terrace Level Public Amenity Space Standing Areas	
(standing - summer)	
Roof Level Public Amenity Space Standing Areas (standing - summer)	
Off-site (Configuration 2)	
Waterway (no defined use)	
Roads (walking - windiest)	10, 11, 303
Thoroughfares (strolling - windiest)	
Railway Station Platforms (standing - windiest)	5-
Ground Level Entrances (standing - windiest)	

Table 12.4 Mitigation Measures.

Receptor	
On-site (Configurations3	and 4)
Roads (walking - windiest)	1(
Thoroughfares (strolling - windiest)	15, 25, 30, 32, 34, 37, 38, 41 91, 93, 95, 98, 101-103, 105 144, 151, 152, 154, 157, 10 191, 193, 194, 196, 1
Maintenance Areas (strolling - windiest)	231,
Pedestrian Crossing Waiting Areas (standing - windiest)	

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Receptor Reference (Probe Location Number)

375, 377, 379.

-336, 338-348, 351, 352, 356, 357, 359-367, 370, 371, 373, 8, 395, 397, 400, 401, 403-407, 414, 415, 420, 421, 425.

337, 349, 350, 353-355, 410, 411.

427-429, 431-433,

426, 430, 434-439.

304-307, 309, 310.

, 385, 386, 389, 392, 396, 398, 399, 402, 409.

1, 4.

-8, 311, 312, 314, 315, 423, and 424.

3, 9, 12-14, 16-19.

Receptors of Configurations 3 and 4: The Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme, and The Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings, the Indicative Landscaping Scheme, and Indicative Wind

> **Receptor Reference** (Probe Location Number)

04, 106, 108, 182, 195, 199, 201.

1, 43, 44, 47-49, 52, 55-59, 61-63, 65, 66, 79-82, 85, 86, 89-, 107, 112-120, 122-125, 127, 129-134, 136, 138, 140, 141, 68-170, 174, 176-178, 180, 181, 183, 184, 186, 188, 189, 97, 205-208, 211, 213, 215, 218, 220-222, 224, 225.

, 235, 245, 255, 262, 263, 276, 301.

198, 200, 202.

Receptor	Receptor Reference	
Ground Level Entrances (standing - windiest)	36, 39, 40, 42, 45, 51, 64, 71, 77, 78, 83, 84, 87, 92, 94, 97, 121, 126, 128, 135, 137, 139, 142, 143, 145-150, 153, 155, 159, 161, 163, 164, 167, 171-173, 175, 179, 185, 187, 190, 192, 204, 210, 212, 216, 217, 223.	
Ground Level Public Amenity Space Standing Areas	35, 46, 60, 72-76, 88, 96, 109, 110, 156, 158, 160, 162, 165, 166.	
(standing - summer)		
Terrace Level Public Amenity Space Standing Areas	238-244, 246-248, 251-254, 264-275, 277-281.	
Roof Level Public Amenity Space Standing Areas	226-230, 232-234, 236-237, 256-261, 298-300.	
(standing - summer)		
Balcony Level Private Amenity Space Standing Areas	249, 250, 282-297.	
(standing - summer)		
Ground Level Public Amenity Space Outdoor Seating Areas (sitting - summer)	50, 53, 54, 67-70.	
Off-site (Configurations 3	Off-site (Configurations 3 and 4)	
Waterway (no defined use)	21-24, 26, 27.	
Roads (walking - windiest)	10, 11, 20, 111, 203, 209, 214, 219.	
Thoroughfares (strolling - windiest)	1, 4.	
Railway Station Platforms (standing - windiest)	5-8, 28, 29, 31, 33, 99, 100.	
Ground Level Entrances (standing - windiest)	3, 9, 12-14, 16-19.	

POTENTIAL EFFECTS

Enabling and Construction

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- **12.73** The potential wind microclimate impacts during enabling and construction works have not been directly assessed within the wind tunnel, as this is a temporary condition and would be highly variable as the remaining existing buildings are demolished and the Proposed Development is constructed in phases.
- 12.74 Based on the wind conditions assessed in the baseline scenario (Configuration 1), it is expected that wind conditions during the enabling and construction phase would be suitable for a working construction site or pedestrian thoroughfares around the Site (with the hoarding in place). Therefore, the likely effect is expected

to be Negligible and no further design and/or management measures are considered necessary during the enabling/construction phase of the Proposed Development.

12.75 As construction of the Proposed Development proceeds, wind conditions at the Site are expected to gradually to the completion and occupation of the Proposed Development.

Phasing

- **12.76** Phasing of the Proposed Development has not been modelled within the wind tunnel and therefore the wind modelled in detail at this time.
- 12.77 Wind conditions around each phase of the Proposed Development are generally expected to gradually adapt each phase of the Proposed Development.

Completed Development

Configuration 2: The Maximum Parameter Model of the Proposed Development with Existing Surrounding Buildings

12.78 The discussion of wind conditions for the Maximum Parameter Model of the Proposed Development with 12.9 and 12.10.

Pedestrian Comfort

- **12.79** During the windiest season (Figures 12.5 and 12.6), the wind conditions would be mostly suitable for sitting, uncomfortable for all uses.
- **12.80** Wind conditions to the north between the Proposed Development buildings and Aspen Way would range from the intended use if the potential cycle route in this area does come forward.
- **12.81** During the summer season (Figures 12.7 and 12.8), the wind conditions would be mostly suitable for sitting, with wind conditions that would only be suitable for walking use.

adjust from those of the existing Site to those of the completed Proposed Development, as described in the following section 'Completed Development'. Therefore, mitigation measures would need to be in place prior

conditions during the intermediate phases (from existing Site to completed Proposed Development) have not been guantitatively assessed. However, the wind conditions around each phase of the Proposed Development will be assessed with further wind tunnel testing during the RMA stage of each phase. With further wind tunnel testing during the RMA stage, the wind microclimate of the phased construction will be

from those in the baseline scenario to those with the completed Proposed Development built up; further wind tunnel testing during the RMA stage will be conducted to quantitatively verify the suitability of the Site around

existing surrounding buildings is based on the results presented in Figures 12.5 and 12.6 for the windiest season and in Figures 12.7 and 12.8 for the summer season. Safety exceedances are presented in Figures

standing, and strolling use. There would also be areas (receptor locations 14, 383, 407, 414, 419, 425, 426, 431, 433, 434, 436, and 438) with wind conditions that would only be suitable for walking use. Furthermore, there are a couple of areas (receptor locations 432 and 439) with wind conditions that would be considered

suitable for sitting use to strolling use during the windiest season; these wind conditions would be suitable for

standing, and strolling use. There would also be multiple areas (receptor locations 426, 432, 433, and 439)

Roads - On-site

12.82 The on-site roads would have wind conditions ranging from suitable for standing to strolling use during the windiest season which would represent a Moderate Beneficial to Minor Beneficial effect (not significant).

Roads - Off-site

12.83 The off-site roads would have wind conditions ranging from suitable for standing to strolling use during the windiest season which would represent a Negligible effect (not significant). Wind conditions at measurement locations 385, 386, 392, 402 and 409 would be one category windier than in the baseline scenario (Configuration 1) and suitable for strolling use during the windiest season; these wind conditions would be suitable for the intended use.

Thoroughfares - On-site

12.84 The on-site thorough fares would have wind conditions ranging from suitable for standing to walking use during the windiest season which would represent a **Minor Beneficial** to **Negligible** effect (not significant). Isolated instances of walking use wind conditions at thoroughfare locations are considered acceptable and suitable for the intended use.

Thoroughfares – Off-site

12.85 The off-site thoroughfares would have wind conditions suitable for standing use to strolling use during the windiest season which would represent a Negligible effect (not significant). Wind conditions at the off-site thoroughfare locations 1 and 4 would remain consistent with the baseline (Configuration 1) or one category calmer.

Railway Station Platforms - Off-site

- **12.86** The off-site railway station platforms would have wind conditions ranging from suitable for sitting to strolling use during the windiest season which would represent a Minor Beneficial to Negligible effect (not significant)
- 12.87 The Minor Beneficial effect would occur at measurement locations 312 and 314 as wind conditions would be calmer than in the baseline scenario (Configuration 1) and suitable for the intended use with standing use wind conditions during the windiest season. Strolling use wind conditions at measurement location 424 represent a Negligible (not significant) effect as wind conditions at this location would be one category calmer than in the baseline scenario (Configuration 1).

Pedestrian Crossing Waiting Areas – On-site

The on-site pedestrian crossing waiting areas would have wind conditions suitable for standing use during 12.88 the windiest season which would represent a **Negligible** effect (not significant).

Ground Level Entrances- On-site

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12.89 The on-site ground level entrances would have wind conditions ranging from suitable for sitting to walking use during the windiest season which would represent a Minor Beneficial to Negligible effect (not significant) for sitting and standing uses, and a Minor Adverse to Moderate Adverse effect (significant) for strolling and walking uses respectively. The Moderate Adverse effect (significant) occurs at receptor locations 383, 407, 414, and 425. The Minor Adverse effect (significant) occurs at receptor locations 320, 338, 339, 340, 346, 352, 356, 359, 365, 366, 381, 382, 400, and 401,

Ground Level Entrances- Off-site

effect (significant) occurs at receptor locations 9, 13, 16, 17, and 18.

Waterways

two categories windier than in the baseline scenario (Configuration 1).

Ground Level Public Amenity Spaces

receptor location 410.

Terrace Level Public Amenity Spaces

Roof Level Public Amenity Spaces

434, 436, 437, and 438.

Safety

12.90 The off-site ground level entrances would have wind conditions ranging from suitable for standing to walking use during the windiest season which would represent a Negligible effect (not significant) and a Minor Adverse to Moderate Adverse effect (significant) (respectively strolling use and walking use wind conditions). The Moderate Adverse effect (significant) occurs at receptor location 14. The Minor Adverse

12.91 Wind conditions at the waterway locations 304-307, 309, 310 would be suitable for standing use during the windiest season, with strolling use wind conditions at location 305. These wind conditions would be one to

12.92 The on-site ground level public amenity spaces would have wind conditions ranging from suitable for sitting to strolling use during the summer season which would represent a Minor Beneficial to Negligible effect (not significant) and a Minor Adverse effect (significant). The Minor Adverse effect (significant) occurs at

12.93 The on-site terrace level public amenity spaces would have wind conditions ranging from suitable for standing to walking use during the summer season which would represent a **Negligible** effect (not significant) and a Minor Adverse to Moderate Adverse effect (significant). The Moderate Adverse effect (significant) occurs at receptor locations 432 and 433. The Minor Adverse effect (significant) occurs at receptor location 431.

12.94 The on-site roof level public amenity spaces would have wind conditions ranging from suitable for standing to walking use during the summer season which would represent a Negligible effect (not significant) and a Minor Adverse to Moderate Adverse effect (significant). The Moderate Adverse effect (significant) occurs at receptor locations 426 and 439. The Minor Adverse effect (significant) occurs at receptor locations 430,

12.95 Safety exceedances are presented in Figures 12.9 and 12.10. There would be exceedances of the 15m/s safety limit in multiple areas (receptor locations 14, 320, 382, 383, 386, 407, 410, 414, 419, 425-427, 431-434, 438, and 439). There would also be exceedances of the 20m/s safety limit in one area (receptor location 439). Otherwise, there are no other areas with exceedances of the 15m/s safety limit or the 20m/s safety limit.



Figure 12.5 Configuration 2: Wind conditions around the Ground Level of the Maximum Parameter Model of the Proposed Development with Existing Surrounding Buildings during the Windiest Season – Ground Level

Figure 12.6 Configuration 2: Wind Conditions around the Upper Levels of the Maximum Parameter Model of the Proposed Development with Existing Surrounding Buildings during the Windiest Season – Roof Level









Figure 12.7 Configuration 2: Wind conditions around the Ground Level of the Maximum Parameter Model of the Proposed Development with Existing Surrounding Buildings during the Summer Season – Ground Level





Figure 12.8 Configuration 2: Wind conditions around the Upper Levels of the Maximum Parameter Model of the Proposed Development with Existing Surrounding Buildings during the Summer Season – Roof Level









Figure 12.9 Configuration 2: Safety Exceedances around the Ground Level of the Maximum Parameter Model of the Proposed Development with Existing Surrounding Buildings – Ground Level

Figure 12.10 Configuration 2:Safety Exceedances around the Upper Levels of the Maximum Parameter Model of the Proposed Development with Existing Surrounding Buildings – Roof Level







0 20 40m

Configuration 3: The Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme

12.96 The discussion of wind conditions for Configuration 3 is based on the results presented in Figures 12.11, 12.12, and 12.13 for the windiest season and in Figures 12.14, 12.15, and 12.16 for the summer season. Safety exceedances are presented in Figures 12.17, 12.18, and 12.19,

Pedestrian Comfort

- **12.97** During the windiest season (Figures 12.11, 12.12, and 12.13), the wind conditions would be mostly suitable for sitting, standing, and strolling use. There would also be several areas (receptor locations 168, 273, and 286) with wind conditions that would only be suitable for walking use. Furthermore, there would be an area (receptor location 296) with wind conditions that would be uncomfortable for all pedestrian use.
- **12.98** Wind conditions to the north between the Proposed Development and Aspen Way would range from suitable for sitting use to strolling use during the windiest season; these wind conditions would be suitable for the intended use if the potential cycle route in this area does come forward.
- **12.99** During the summer season (Figures 12.14, 12.15, and 12.16), the wind conditions would be mostly suitable for sitting, standing, and strolling use. There would also be a couple of areas (receptor locations 273 and 296) with wind conditions that would only be suitable for walking use.
- 12.100 The proposed indicative landscaping scheme was included within the model (Figures 44-46 of the technical appendix, ES Volume 3, Appendix Wind Microclimate").

Roads - On-site

12.101 The on-site roads would have wind conditions ranging from suitable for sitting to strolling use during the windiest season which would represent a Major Beneficial to Minor Beneficial effect (not significant).

Roads - Off-site

12.102 The off-site roads would have wind conditions ranging from suitable for standing to strolling use during the windiest season which would represent a Negligible effect (not significant). Wind conditions at all these locations would remain consistent with those in the baseline scenario (Configuration 1) or one category calmer (measurement locations 10 and 11).

Thoroughfares - On-site

12.103 The on-site thoroughfares would have wind conditions ranging from suitable for sitting to walking use during the windiest season which would represent a Moderate Beneficial to Negligible effect (not significant) and a minor adverse effect (significant). The Minor Adverse effect (significant) occurs at receptor location (168) which would have walking use wind conditions.

Thoroughfares – Off-site

12.104 The off-site thoroughfares would have wind conditions suitable for standing use during the windiest season which would represent a Negligible effect (not significant). These wind conditions would be one category calmer than in the baseline scenario (Configuration 1).

Maintenance Areas

12.105 The on-site maintenance areas would have wind conditions ranging from suitable for standing to strolling use

Railwav Station Platforms – Off-site

12.106 The off-site railway station platforms would have wind conditions ranging from suitable for sitting to strolling this represents a Minor Beneficial (not significant) effect.

Pedestrian Crossing Waiting Areas

12.107 The on-site pedestrian crossing waiting areas would have wind conditions suitable for standing use during the windiest season which would represent a **Negligible** effect (not significant).

Ground Level Entrances -On-site

12.108 The on-site ground level entrances would have wind conditions ranging from suitable for sitting to strolling 39, 94, 121, 142, and 167.

Ground Level Entrances -Off-site

12.109 The off-site ground level entrances would have wind conditions ranging from suitable for sitting to strolling 13, 14, and 16 with strolling use wind conditions.

Waterways

- **12.110** Wind conditions at waterway locations (represented in Configuration 3 by measurement locations 21-24, 26, to two categories windier than in the baseline scenario (Configuration 1).
- 12.111 Waterway locations are expected to be used more frequently during the summer season (when the area is those in the baseline (Configuration 1) at these locations.

Ground Level Public Amenity Space Standing Areas

12.112 The on-site ground level public amenity space standing areas would have wind conditions ranging from Negligible effect (not significant).

during the windiest season which would represent a Minor Beneficial to Negligible effect (not significant).

use during the windiest season which would represent a Minor Beneficial to Negligible effect (not significant). The Negligible effect (not significant) occurs at receptor locations 29 and 100 with strolling use wind conditions. This is noted to be consistent with the baseline scenario (Configuration 1) or one category calmer. One category calmer wind conditions than in the baseline scenario (Configuration 1) would occur at measurement location 31 (measurement location 314 in Configuration 1) with standing use wind conditions;

use during the windiest season which would represent a Minor Beneficial to Negligible effect (not significant) and a Minor Adverse effect (significant). The Minor Adverse effect (significant) occurs at receptor locations

use during the windiest season which would represent a Minor Beneficial to Negligible effect (not significant) and a Minor Adverse effect (significant). The Minor Adverse effect (significant) occurs at receptor locations

27) would range from suitable for standing use to strolling use wind conditions during the windiest season, with strolling use wind conditions at measurement locations 22 and 23. These wind conditions would be one

most likely to be used), and wind conditions in this period of the year at these locations would range from suitable for sitting use to standing use; these wind conditions would be the same or one category windier than

suitable for sitting to standing use during the summer season which would represent a Minor Beneficial to

Terrace Level Public Amenity Space Standing Areas

12.113 The on-site terrace level public amenity space standing areas would have wind conditions ranging from suitable for sitting, standing, and walking use during the summer season which would represent a Minor Beneficial to Negligible effect (not significant) and a Moderate Adverse effect (significant). The Moderate Adverse effect (significant) occurs at receptor location 273.

Roof Level Public Amenity Space Standing Areas

12.114 The on-site roof level public amenity space standing areas would have wind conditions ranging from suitable for sitting to strolling use during the summer season which would represent a Minor Beneficial to Negligible effect (not significant) and a Minor Adverse effect (significant). The Minor Adverse effect (significant) occurs at receptor locations 257 and 260.

Balcony Level Private Amenity Space Standing Areas

12.115 The on-site balcony level private amenity space standing areas would have wind conditions ranging from suitable for sitting to walking use during the summer season which would represent a Minor Beneficial to Negligible effect (not significant) and a Minor Adverse to Moderate Adverse effect (significant). The

moderate adverse effect (not significant) occurs at receptor location 296. The Minor Adverse effect (not significant) occurs at receptor locations 286 and 293.

Ground Level Public Amenity Space Outdoor Seating Areas

sitting use during the summer season which would represent a **Negligible** effect (not significant).

Safety

12.117 Safety exceedances are presented in Figures 12.17, 12.18, and 12.19. There would be exceedances of the safety limit or the 20m/s safety limit.



12.116 The on-site ground level public amenity space outdoor seating areas would have wind conditions suitable for

15m/s safety limit in multiple areas (receptor location 168, 180, 257, 260, 273, 286, 293, and 296). There would also be exceedances of the 20m/s safety limit in one area (receptor location 296). Strong winds exceedances represent a safety concern for more vulnerable pedestrians; therefore all these instances represent an Adverse effect (significant). Otherwise, there are no other areas with exceedances of the 15m/s Figure 12.11 Configuration 3: Wind Conditions around the Ground Level of the Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme during the Windiest Season – Ground Level



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Figure 12.12 Configuration 3: Wind Conditions around the Upper Levels (ISO 1) of the Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme during the Windiest Season – Isometric Views and Roof Level





TRIUM



Figure 12.13 Configuration 3: Wind Conditions around the Upper Levels (ISO 2) of the Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme during the Windiest Season – Isometric Views



NORTH / WEST





NORTH / WEST

NORTH / EAST





Figure 12.14 Configuration 3: Wind Conditions around the Ground Level of the Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme during the Summer Season – Ground Level



Figure 12.15 Configuration 3: Wind Conditions around the Upper Levels (ISO 1) of the Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme during the Summer Season – Isometric Views and Roof Level









Figure 12.16 Configuration 3: Wind Conditions around the Upper Levels (ISO 2) of the Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme during the Summer Season – Isometric Views







NORTH / WEST



NORTH / WEST

NORTH / EAST







Figure 12.18 Configuration 3: Safety Exceedances around the Upper Levels (ISO 1) of the Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme - Isometric Views and Roof Level





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Figure 12.19 Configuration 3: Safety Exceedances around the Upper Levels (ISO 2) of the Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme - Isometric Views







NORTH / WEST

NORTH / WEST

NORTH / EAST







MITIGATION MEASURES. MONITORING AND RESIDUAL EFFECTS

Enabling and Construction Mitigation

- **12.118** During enabling and construction works, the areas under construction will be surrounded by solid hoarding until the point where the building becomes occupied. Wind mitigation measures associated with the completed Proposed Development would need to be in place prior to the completion and occupation of the Proposed Development.
- **12.119** No additional mitigation measures or monitoring, beyond the use of hoardings, would be required during the enabling and construction works as no adverse wind effects are expected as discussed above. Accordingly, the likely significant effects during enabling and construction would be expected to remain **Negligible** (not significant).

Completed Development Mitigation

Configuration 3: The Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme

- **12.120** The impact of wind mitigation measures has been investigated only for the Indicative Scheme Model of the Proposed Development, as mitigating the Maximum Parameter Model is expected to result in unnecessarily large measures which could be unfeasible and unrealistic, and this would not be representative of a scheme which could be developed and for which no landscaping has been proposed. Mitigation is only conducted on the Indicative Scheme as it provides a more realistic representation of the real wind conditions when the Proposed Development comes forward. No specific monitoring measures have been proposed.
- **12.121** The following areas of the Indicative Scheme model of the Proposed Development would require mitigation measures:
 - On-site: Thoroughfares:
 - Receptor location 168, around the south-western corner of NQD4.
 - Receptor location 180, around the south-eastern corner of NQD4.
 - On-site: Railway Station Platforms:
 - Receptor locations 29 and 100, on the western platform of West India Quay railway station.
 - On-site: Ground Level Entrances:
 - Receptor location 39, along the southern façade of NQA4.
 - Receptor location 94, along the northern façade of NQA4. 0
 - Receptor location 121, along the southern facade of NQA1. 0
 - Receptor location 142, along the northern façade of NQD3. 0
 - Receptor location 167, along the western façade of NQD4.
 - Off-site: Ground Level Entrances:

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- On-site: Terrace Level Public Amenity Spaces:
 - Receptor location 273, on the terrace of NQB1
- On-site: Roof Level Public Amenity Spaces:
 - Receptor locations 257 and 260, on the roof of NQD2.
- On-site: Balcony Level Private Amenity Spaces:
 - Receptor location 286, on a mid-level balcony of the western façade of NQA1.
 - 0
 - Receptor location 296, on a high-level balcony of the western facade of NQA1.
- 12.122 Wind mitigation measures have been wind tunnel tested to mitigate these windier than desired locations; results have been discussed below in Configuration 4.

Configuration 4: The Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings, the Indicative Landscaping Scheme, and Wind Mitigation Measures

- 12.123 The discussion of wind conditions for the Indicative Scheme model of the Proposed Development with existing
- 12.124 Configuration 4 tested a conceptual mitigation strategy to demonstrate that wind conditions at and detail and refined during the RMA stages of the Proposed Development.
- 12.125 Wind mitigation measures tested in Configuration 4 consisted of:
 - Indicative Landscaping at terrace locations 273-275 and 256-261;
 - 1.5m high solid balustrade at balcony locations 286, 293, and 296;
 - Entrances 29, 39, 94, 100, 121, 142, 161, and 167 recessed by 1.5m within the facade;
 - 50% porous screens 1.5m wide and 2m high on either side of the entrances;
 - from ground level) to the south-east of the Site along the guayside;
 - 1.5m high solid balustrade included at terrace locations 273-275;
 - ground;

 Receptor locations 13, 14, and 16, along the northern edge of Canary Wharf Crossrail Station (currently not used as entrance but it is understood this is an future aspiration for this location).

Receptor location 293, on a high-level balcony of the eastern façade of NQA1.

surrounding buildings, the Indicative landscaping scheme and wind mitigation measures in place is based on the results presented in Figures 12.20, 12.21, and 12.22 for the windiest season and in Figures 12.23, 12.24, and 12.25 for the summer season. Safety exceedances are presented in Figures 12.26, 12.27, and 12.28.

surrounding the Proposed Development can be improved; the wind mitigation strategy will be developed in

Potential mitigation measures have been included at the off-site entrances 13, 14, 16 in the form of

Inclusion of a porous sculpture 4m high with a 2m high 50% porous screens (leaving 2m clearance

• The solid canopies to the south-east (close to measurement locations 168, 177, 179, and 180) have been extended along the western, southern and eastern façade and made 3m wide, at 3m from the

One additional 8m high deciduous tree included between measurement locations 192 and 193;

- Three 3-4m high deciduous trees in 0.5m high cubical planters have been included to the west of measurement location 168:
- Two 4m wide and 2m high 30% porous screens included to the south-east of the Site at 3m from the facades around measurement location 168: and
- Eight 8m high proposed trees to the west of the Site have been replaced with 12m high evergreen trees close to measurement locations 93, 120 and 122.
- 12.126 Photos of these wind mitigation measures can be found in Figures 38-43 of the technical appendix. ES Volume 3, Appendix Wind Microclimate.

Pedestrian Comfort

- 12.127 During the windiest season (Figures 12.20, 12.21, and 12.22), wind conditions at ground level would range from suitable for sitting use to strolling use at all locations.
- 12.128 Wind conditions to the north between the Proposed Development and Aspen Way would range from suitable for sitting use to strolling use during the windiest season; these wind conditions would be suitable for the intended use if the potential cycle route in this area would come forward.
- 12.129 During the summer season (Figures 12.23, 12.24, and 12.25), the wind conditions would be mostly suitable for sitting use to standing use, with a few isolated instances of strolling use wind conditions at measurement locations 39, 168, and 191.
- 12.130 The proposed indicative landscaping scheme was included within the model (Figures 44-46 of the technical appendix, ES Volume 3, Appendix Wind Microclimate").

Roads - On-site

12.131 The on-site roads would have wind conditions suitable for standing use during the windiest season which would represent a Moderate Beneficial effect (not significant).

Roads - Off-site

12.132 The off-site roads would have wind conditions suitable for standing use during the windiest season which would represent a **Negligible** effect (not significant). Wind conditions at measurement locations 10 and 11 to the south east would be one category calmer than in the baseline scenario (Configuration 1)

Thoroughfares - On-site

12.133 The on-site thoroughfares would have wind conditions ranging from suitable for sitting to strolling use during the windiest season which would represent a **Moderate Beneficial** to **Negligible** effect (not significant).

Thoroughfares - Off-site

12.134 The off-site thoroughfares would have wind conditions suitable for standing use to strolling use during the windiest season which would represent a **Negligible** effect (not significant). Wind conditions at thoroughfare location 4 would be one category calmer than in the baseline scenario (Configuration 1).

Maintenance Areas

12.135 The on-site maintenance areas would have wind conditions ranging from suitable for standing to strolling use during the windiest season which would represent a Minor Beneficial to Negligible effect (not significant).

Railway Station Platforms - Off-site

(Configuration 1), representing a Negligible (not significant) effect.

Pedestrian Crossing Waiting Areas

the windiest season which would represent a **Negligible** effect (not significant).

Ground Level Entrances -On-site

effect.

Ground Level Entrances -Off-site

12.139 With the inclusion of the potential mitigation measures in the form of 50% porous screens 1.5m wide and 2m standing use wind conditions.

Waterways

- 12.140 Wind conditions at waterway locations (measurement locations 21-24, 26, 27) would range from suitable for (Configuration 1).
- 12.141 Waterway locations are expected to be used more frequently during the summer season, and wind conditions same or one category windier than those in the baseline (Configuration 1).

Ground Level Public Amenity Space Standing Areas

Negligible effect (not significant).

12.136 The off-site railway station platforms would have wind conditions ranging from suitable for sitting to strolling use during the windiest season which would represent a **Negligible** effect (not significant). Strolling use wind conditions at measurement locations 29, 31, and 100 would be consistent or calmer with the baseline scenario

12.137 The on-site pedestrian crossing waiting areas would have wind conditions suitable for standing use during

12.138 The on-site ground level entrances would have wind conditions ranging from suitable for sitting to strolling use during the windiest season. Sitting to standing use wind conditions at entrance locations represent respectively a Minor Beneficial to Negligible effect (not significant) effect; strolling use wind conditions would occur at entrance locations 39, and 161. However, both these entrances would be recessed 1.5m within the facade of the Proposed Development, and this is expected to provide beneficial shelter at these locations resulting in suitable wind conditions for the intended use. This represents a **Negligible** effect (not significant)

high at entrance locations 13, 14 and 16, all the off-site ground level entrances would have wind conditions ranging from suitable for sitting to standing use during the windiest season which would represent a Negligible effect (not significant). Wind conditions at entrances 13, 17, and 18 would be one category windier than in the baseline scenario (Configuration 1); however, would remain suitable for the intended use with

standing use to strolling use during the windiest season, with strolling use wind conditions at measurement locations 22. These wind conditions would be one to two categories windier than in the baseline scenario

in this season would range from suitable for sitting use to standing use; these wind conditions would be the

12.142 The on-site ground level public amenity space standing areas would have wind conditions ranging from suitable for sitting to standing use during the summer season which would represent a Minor Beneficial to Terrace Level Public Amenity Space Standing Areas

12.143 With the inclusion of the wind mitigation measures, the on-site terrace level public amenity space standing areas would have wind conditions ranging from suitable for sitting to standing use during the summer season which would represent a Minor Beneficial to Negligible effect (not significant)

Roof Level Public Amenity Space Standing Areas

- 12.144 With the inclusion of the wind mitigation measures, the on-site roof level public amenity space standing areas would have wind conditions ranging from suitable for sitting use to standing use during the summer season which would represent a Minor Beneficial to Negligible effect (not significant).
- **12.145** Strolling use wind conditions would occur at measurement locations 231 and 301 during the summer season; however, these locations will not be accessible by pedestrians, therefore this represent a Negligible (not significant effect).

Balcony Level Private Amenity Space Standing Areas

12.146 The on-site balcony level private amenity space standing areas would have wind conditions ranging from suitable for sitting use to standing use during the summer season which would represent a Minor Beneficial to **Negligible** effect (not significant).

Ground Level Public Amenity Space Outdoor Seating Areas

12.147 The on-site ground level public amenity space outdoor seating areas would have wind conditions suitable for sitting use to standing use during the summer season which would represent a Negligible effect (not significant) to Minor Adverse (significant) effect. The Minor Adverse (significant) effect is represented by standing use wind conditions at measurement locations 53 and 54; localised wind mitigation measures in the form of dense shrubs 1.5. in high are recommended if long term seating will be intended at these locations.

Safety

- 12.148 Safety exceedances are presented in Figures 12.26, 12.27, and 12.28. Most locations at and surrounding the Proposed Development would have safe wind conditions throughout the year; however, a few isolated instances of strong winds marginally exceeding the 15 m/s safety threshold would persist at measurement locations 160 and 180.
- 12.149 The majority of the locations with instances of strong winds exceeding 15 m/s for more than 2.2 hours per year in Configuration 3 (Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings and the Indicative Landscaping Scheme) have been mitigated with the inclusion of the wind mitigation strategy described above; the frequency of strong winds occurring at measurement locations 168 and 180 have been significantly reduced, however these localised areas would be addressed at the reserved matters stage with additional wind mitigation measures at these locations.
- 12.150 Potential wind mitigation measures likely to provide beneficial shelter at measurement locations 168 and 180 could be in the form of additional localised screens (solid or 50% porous) or dense landscaping in planters both cases at least 1.5m in height which would help to diffuse the strong winds at these locations; additional shelter at measurement location 168 could also be in the form of scattered hard/soft landscaping elements (at least 2m in height) along the Quayside.

- in calmer wind conditions in these areas.
- pedestrian flow to calmer wind condition locations.

12.151 Chamfering these corners at ground level (at least 1 storey high) would reduce the pressure difference between the two facades of the building (NQ.D4) which forces the wind to accelerate around corners, resulting

12.152 If chamfering or rounding these corners is not possible, additional potential mitigation measures at these locations could be in the form of including landscaping elements in planters or artwork at the corners of the building in order to restrict the access of pedestrians to these localized windy areas, and redirect the Figure 12.20 Configuration 4: The Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings, the Indicative Landscaping Scheme, and Wind Mitigation Measures during the Windiest Season– Ground Level



TRIUM

Figure 12.21 Configuration 4: The Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings, the Indicative Landscaping Scheme, and Wind Mitigation Measures during the Windiest Season - Isometric Views and Roof Level







80m

Figure 12.22 Configuration 4: The Indicative Scheme Model of the Proposed Development with Existing Surrounding Buildings, the Indicative Landscaping Scheme, and Wind Mitigation Measures during the Windiest Season - Isometric Views



NORTH / WEST





NORTH / WEST

NORTH / EAST

LEGEND:	
LDDC COMFORT CATEGORIES:	SENSOR LOCATION:
Sitting	Ground Level
Standing	
Strolling	
Walking —	Balcony/Roof Level
Uncomfortable	



