



## **Union (T2), Water Street, Manchester**

Updated Chapter 11: Wind Microclimate (Rev 1)

06 May 2020

# 11 Wind Microclimate

## Introduction

- 11.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development with respect to wind microclimate. This Chapter also describes the methods used to assess the effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted.
- 11.2 This wind microclimate Chapter has been prepared by Urban Microclimate Ltd. The Chapter is supported by the following:
- Figure 11.1 Annual Wind Climate at Site
  - Figure 11.2 Wind Microclimate Suitability Assessment
  - Appendix 11.1 Wind Microclimate

## Policy Context

### Legislation

- 11.3 There are no legislative policies relating to the assessment of environmental wind flows in the built environment.

### National Planning Policy

- 11.4 Although there are no national planning policies directly relating to wind microclimate issues, the National Planning Policy Framework (updated in June 2019) emphasises the benefits of a high-quality built environment. An example of this is presented in Section 12, which states that developments should:

**"establish or maintain a strong sense of place, using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit"**

- 11.5 The National Design Guide (October 2019) forms part of the associated planning practice guidance. Within this guide, the section Built Form B2 'Appropriate building types and forms' states that:

**"Proposals for tall buildings (and other buildings with a significantly larger scale or bulk than their surroundings) require special consideration. This includes their location and siting; relationship to context; impact on local character, views and sight lines; composition - how they meet the ground and the sky; and environmental impacts, such as sunlight, daylight, overshadowing and wind. These need to be resolved satisfactorily in relation to the context and local character."**

- 11.6 The section Context C1 'Understand and relate well to the site, its local and wider context' goes on to state:

**"Well-designed new development responds positively to the features of the site itself and the surrounding context beyond the site boundary. It enhances positive qualities and improves negative ones. Some features are physical, including:**

- **environment - including landscape and visual impact, microclimate..."**

### Local Planning Policy

- 11.7 Manchester City Council's Local Development Framework Core Strategy Development Plan Document (adopted July 2012) includes Policy EN2 Tall Buildings, for which tall buildings are

defined as buildings which are substantially taller than their neighbourhoods and / or which significantly change the skyline. Policy EN2 states:

**"...tall buildings can have a significant impact on the local environment and its micro-climate. It is therefore expected that this impact be modelled and that submissions for tall buildings also include appropriate measures to create an attractive, pedestrian friendly local environment."**

- 11.8 The Guide to Development in Manchester, Supplementary Planning Document and Planning Guidance (adopted April 2007), Section 2. Design, Paragraph 2.40 (Hard landscaped areas within the public realm should be attractive) states:

**"Where the public realm includes hard landscaped areas, its design should reflect the level and nature of their use, and should consider issues such as overshadowing, prevailing winds..."**

- 11.9 Within the same guide, Section 12. The City Centre, Paragraph 12.8 (Development Quality) states:

**"...Key questions will be ... the microclimate, including overshadowing and air turbulence effects, created by the relationship of the building to those adjacent; and the quality and usability of the spaces surrounding the building."**

#### **Additional Standards and Guidance**

- 11.10 The assessment of environmental wind flows lies outside the scope of BS EN 1991-1-4:2005<sup>1</sup>, the current European and UK Standard for wind actions on structures, which focuses on wind loading issues.
- 11.11 The impact of environmental wind on pedestrian spaces and the consequent suitability of these spaces for planned usage are described by and compared against the industry standard Lawson criteria<sup>2</sup>, which are recognised by Local Authorities as a suitable benchmark for wind assessments.

#### **Assessment Methodology and Significance Criteria**

##### **Assessment Methodology**

- 11.12 Due to the scale of the Proposed Development, a comprehensive assessment of existing and likely pedestrian level wind conditions upon completion of the Development has been undertaken based on wind tunnel testing of a physical scale model and the industry standard Lawson criteria. This allows a detailed comparison to be drawn between the existing Site and the post-development Site once the Development is constructed. Due to the changing conditions and pedestrian activities during the construction process, the potential for additional effects during the demolition and construction stages is considered qualitatively, based on an experience-based review. This is standard practice for construction periods of the extent proposed.
- 11.13 The detailed assessments of baseline and operational conditions combine the following elements to determine the probability of local wind speeds exceeding comfort and safety thresholds for a range of common activities based on the Lawson criteria for pedestrian comfort and safety:
- Measured pedestrian level wind speeds at key areas in and around the Site, from model-scale boundary layer wind tunnel testing; with
  - Long-term wind frequency statistics transposed from the nearest suitable weather centre to apply directly at the Site.

<sup>1</sup> BS EN 1991-1-4:2005 Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions

<sup>2</sup> Lawson, T.V. (1990), "The Determination of the Wind Environment of a Building Complex before Construction" Department of Aerospace Engineering, University of Bristol, Report Number TVL 9025

- 11.14 Details of the wind tunnel testing are provided at Appendix 11.1 of this ES. The tests were conducted in RWDI Anemos Ltd.'s wind tunnel facility, where an atmospheric boundary layer representative of that at the Site was simulated. The wind tunnel model was constructed at a scale of 1:300 and covers a full-scale extent of 360 m from the approximate centre of the St John's masterplan (up to and beyond the extent of potential significant effects of the Proposed Development).
- 11.15 The Proposed Development was modelled based on 3D models, plans and elevations provided by the design team in March 2020. The surrounding existing and consented future buildings were represented to a sufficient level of detail to reproduce the wind flows at the Site and on surrounding land. To ensure the tests are conservative, proposed semi-mature trees, as upon planting, were modelled in winter, or bare, format. Existing surrounding trees were also modelled in winter format.
- 11.16 To inform the testing, an initial experience-based assessment was carried out to identify areas of potential accelerated winds in and around the Site resulting from the Proposed Development, and to identify the potential extent of likely significant wind effects within the surrounding area. Existing and proposed pedestrian activities were also reviewed to identify areas of increased sensitivity to wind effects, such as recreational areas and building entrances. Wind speed measurements at these key pedestrian level locations were then made using probes capable of measuring fluctuating pressure differences that are calibrated against wind speed. A system of probes running simultaneously were used to obtain results from up to 115 locations. In accordance with best practice, measurements were taken for a full range of wind directions in increments of 22.5°. To fully meet the requirements of the Lawson criteria, recordings were taken for a sufficient length of time to determine the mean and gust wind speeds.
- 11.17 Wind tunnel tests were carried out for the following configurations:
- Existing / Baseline Site conditions;
  - Proposed Development with existing (baseline) surrounds;
  - Proposed Development with additional mitigation and interim surrounds; and
  - Proposed Development with future surrounds.
- 11.18 The list of committed schemes, as set out in Appendix 3.2 were reviewed using publicly available information and professional experience to determine their relevance to the wind assessment. Buildings under construction at the time of assessment were included within the baseline, in their completed form. This includes the following schemes:
- i. St John's T1 (ref 114385/FO/2016)
  - ii. Manchester Goods Yard and No.1 Grape Street (ref 121511/FO/2018)
  - iii. St. John's Place Zone 2, Globe and Simpson (ref 121721/FO/2018)
  - iv. Old Granada Studios (ref 118040/FO/2017)
  - v. The Factory (ref 119890/VO/2018)
  - vi. Astley and Byrom House (ref 119610/FO/2018)
  - vii. Salford Central (ref 17/70439/REM)
  - viii. Salford Central (ref 17/70082/REM)
  - ix. Salford Central (ref 16/68199/REM)
- 11.19 The future committed developments considered within the cumulative effects assessment comprises the following surrounding schemes:
- a. Proposed Union T1 (ref 125655/FO/2019)
  - b. St. John's Place Zones 1, 3 & 4 (ref 109660/FO/2015/C1)
  - c. Middlewood Locks (ref 14/65457/OUTEIA)
  - d. Middlewood Locks (ref 14/65793/OUT)
  - e. Salford Central (ref 16/68325/OUT)

- f. Salford Central Zone C (ref 19/73721/REM)
- g. Trinity Islands (ref 115107/FO/2017)

- 11.20 The baseline context includes the approved St John's T1 (item i. above) as this consent has been implemented and works are underway to form the basement of that building; however, T1 is also in the ownership of the Applicant who will not progress this development and is committed to delivering the proposed Union T1 development (item a. above). For this reason, the development of potential additional mitigation measures (as discussed in paragraphs 11.97 to 11.106) focuses on an interim scenario with the proposed Union T1 development replacing the approved St John's T1 and the remainder of the surrounding area as per the baseline context.
- 11.21 Further committed developments in the area lie beyond the extent of the wind tunnel model and are considered too distant from the Site to have any potential significant cumulative effects.
- 11.22 Long-term wind frequency statistics from Manchester Airport, for the period 2001 to 2015, were corrected to apply directly at the Site, taking account of differences in upwind terrain and altitude between the weather centre and the Site based on the widely accepted Deaves and Harris log law wind model of the atmospheric boundary layer and BS EN 1991-14:2005. This is considered suitable to provide a statistically robust climate model for the Site.
- 11.23 Details of the Lawson criteria for pedestrian safety, or distress, are presented in Table 11.1 and are based on the exceedance of the threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring once per annum. These thresholds represent wind speeds with the potential to destabilise the less able or more susceptible members of the public (including elderly, cyclists and children) and able-bodied users.

**Table 11.1 Lawson Criteria for Pedestrian Safety or Distress**

| Threshold Mean-hourly Wind Speed Exceeded Once a Year | Safety Rating                    | Qualifying Comments                                                                                   |
|-------------------------------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------|
| 15 m/s                                                | S2 Unsuitable for general public | Less able and cyclists find conditions physically difficult.                                          |
| 20 m/s                                                | S1 Unsuitable for able-bodied    | Able-bodied persons find conditions difficult. Physically impossible to remain standing during gusts. |

- 11.24 Details of the Lawson criteria for pedestrian comfort are presented in Table 11.2 and are based on the exceedance of threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring less than 5% of the time. The thresholds represent upper bounds of acceptability for a range of common activities. The value of 5% is linked to the specified threshold speeds and gives a reasonable allowance for extreme and relatively infrequent winds that are acceptable within each category.

**Table 11.2 Lawson Criteria for Pedestrian Comfort**

| Threshold Mean-hourly Wind Speed Exceeded < 5% of the Time | Comfort Rating / Activity         | Qualifying Comments                                                      |
|------------------------------------------------------------|-----------------------------------|--------------------------------------------------------------------------|
| 4 m/s                                                      | C4 Long term Sitting              | Reading a newspaper and eating and drinking.                             |
| 6 m/s                                                      | C3 Standing or short term Sitting | Appropriate for bus stops, window shopping and building entrances.       |
| 8 m/s                                                      | C2 Walking and Strolling          | General areas of walking and sightseeing.                                |
| 10 m/s                                                     | C1 Business walking               | Local areas around tall buildings where people are not likely to linger. |

- 11.25 The pedestrian level wind environment assessment is summarised in terms of suitability for various activities, based on the above criteria. The assessment takes full account of seasonal variations in wind conditions and pedestrian activities. Thus, conditions for recreational activities focus on summer but also consider spring and autumn. Recreational activities do not consider winter comfort ratings as it is anticipated that users would not demand suitable conditions 95% of the time in winter but would instead be satisfied to use the amenity spaces on occasions when conditions, including precipitation and temperature, permit. Conditions for pedestrian thoroughfare, access or waiting (for example at bus stops) consider all seasons, with winter being predominantly the critical season due to generally higher wind speeds in the winter months.
- 11.26 The activities considered, and their relation to the comfort criteria detailed above, are shown in Table 11.3. The table is ordered in terms of decreasing sensitivity to wind speeds. Conditions considered suitable for the more sensitive activities would also be suitable for the subsequent, less sensitive, uses.

**Table 11.3 Suitability Assessment**

| Suitability                               |                                                                                                                                                            | Target Lawson comfort and safety criteria for specified seasons                   |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Outdoor seating                           | For long periods of sitting, such as for an outdoor café or picnic area.                                                                                   | 'Long term sitting' (C4) in at least summer.                                      |
| Entrances, waiting areas                  | For pedestrian ingress/egress at entrances, or short periods of sitting or standing such as at a bus stop, taxi rank, meeting point, window shopping, etc. | 'Standing or short term sitting' (C3) in all seasons.                             |
| General leisure (excluding seating areas) | For leisure uses excluding long periods of outdoor sitting, such as active leisure, general park spaces, children's play area, etc.                        | 'Standing or short term sitting' (C3) from spring to autumn.                      |
| Thoroughfare                              | For pedestrian access to, and passage through, the Site and surrounding area.                                                                              | 'Business walking' / 'Walking or strolling' (C1/C2) in all seasons.               |
| Unsuitable                                | Unsuitable for all activities.                                                                                                                             | Exceeds comfort criterion for 'Business walking' (C1) or safety criteria (S1/S2). |

### Significance Criteria

- 11.27 The significance of any effects is assessed based on the suitability of wind conditions in each area against the current or planned pedestrian activities. Although pedestrian perception, and thus sensitivity, differs with the activity being undertaken, this is directly considered within the assessment criteria.
- 11.28 The assessment criteria apply upper bounds of acceptability, and so exceedances have the potential to fundamentally alter the character of a space. It is therefore appropriate to consider the sensitivity of pedestrian level receptors as high. On this basis:
- Effects on pedestrian safety, where conditions change from suitable to unsuitable (for adverse impact) or from unsuitable to suitable (for beneficial impact), are generally considered **major**. Where the effect is marginal, relative to the safety criteria, the effect is considered **moderate**. If a moderate significance is applied, details to explain and justify this are included in the discussion.
  - Effects on pedestrian comfort where conditions change from suitable to unsuitable (for adverse impact) or from unsuitable to suitable (for beneficial impact) for current or planned activities are deemed **moderate**.
  - Where conditions change from marginal (or tolerable) to suitable or unsuitable for current or planned activities the effect is deemed **minor**. Similarly, a change from suitable or unsuitable to marginal / tolerable is also deemed **minor**.

- Any effect that does not alter the suitability of wind conditions with respect to current or planned activities is considered **negligible**.

- 11.29 As an example of the above criteria of significance, where conditions at a building frontage with no current entrances are suitable only for strolling and a proposed development introduced an entrance in this area, wind conditions would need to improve to be suitable for pedestrian ingress / egress for the impact to be insignificant. If wind conditions became marginally windy for an entrance, the impact would be minor adverse even if wind speeds were lower, due to the introduction of a more sensitive activity.
- 11.30 Where existing conditions are calmer than required for existing activities, an increase in wind speeds could be accommodated without the effect being significant, provided conditions remain suitable for pedestrian activities.

### Limitations and Assumptions

- 11.31 The assessment is based on boundary layer wind tunnel testing of a physical scale model. This represents best industry practice, and provides a detailed, robust, quantitative assessment.
- 11.32 Historical wind statistics are used as standard practice due, in part, to lack of certainty in potential future changes in wind patterns, though any changes are expected to be minor.
- 11.33 The current designed-in wind mitigation features were developed for the Proposed Development with future surrounds scenario. Although each feature was also tested for the Proposed Development with the baseline surrounds, the specific combination of features was not tested for this scenario. The results presented for the Proposed Development with baseline surrounds therefore represent a collation of results based on the closest test cases and professional judgement.
- 11.34 The potential additional wind mitigation features were developed for the Proposed Development with interim surrounds scenario, as discussed in paragraph 11.20, as representative of the most likely worst-case scenario.

### Baseline Conditions

- 11.35 The wind climate expected at the Site is summarised in Figure 11.1 in terms of the annual wind speed and direction probability distributions at a reference height of 114 m above local ground level. Seasonal wind speed and direction probability distributions are presented in Appendix 11.1.
- 11.36 Based on the wind climate statistics, winds from the southerly quadrant are prevalent. Light to moderate winds from the south and south-south-east are most common, whilst stronger winds more frequently blow from the south-south-west. Winds from the west-south-west and west also occur frequently, and extreme wind speeds (relevant to pedestrian safety) are most likely to blow from this direction. Northerly winds are generally light and rare, though cold north-easterly winds are common during spring. Wind speeds are generally higher during winter and lower during summer.
- 11.37 The existing open Site is partially sheltered from prevailing southerly winds by The Factory. The Site is exposed to the stronger, but less frequent, westerly winds but the back-pressure created by the consented St John's T1 and Manchester Goods Yard helps limit the resulting wind speeds across the Site. The exposure of St John's T1, Manchester Goods Yard and No.1 Grape Street to these westerly winds does however result in downdraughts and subsequent channelling of winds around and between the buildings to the east of the Site.
- 11.38 The resulting pedestrian level wind environment in and around the existing Site is presented in terms of the Lawson comfort and safety criteria in Appendix 11.1, and is summarised below.

- 11.39 As a result of the downdraughts from the west elevation of the consented St John's T1 reaching pedestrian level and subsequently channelling northwards along Water Street, pedestrian level wind conditions marginally rate as unsuitable, in terms of pedestrian safety, for the general public at the junction of Water Street and the access road to Manchester Goods Yard (location 28 in Figures A11.4 of Appendix 11.1). Here, the once per annum wind speed is approximately 15.6 m/s, against the criterion of 15.0 m/s. The 15 m/s threshold is exceeded approximately 1.5 times per annum, against a target of once per annum.
- 11.40 Otherwise, pedestrian level wind conditions in and around the Site rate as safe for all users.
- 11.41 In terms of pedestrian comfort, with respect to wind force, wind conditions across the Site are suitable for recreational activities including at least short periods of standing or sitting (such as for a meeting point, for example), with suitable conditions for long periods of outdoor sitting (such as for picnics, for example) enjoyed during at least summer. The more sheltered area around the Canal Basin enjoys amenable conditions for outdoor seating throughout the year.
- 11.42 The bus stop on Water Street, near the entrance to the Marriott Hotel, is also expected to enjoy suitable conditions for awaiting a bus, though this bus stop will be removed for proposed Site conditions.
- 11.43 Within the surrounding area, wind conditions at the junction of Water Street and the access road to Manchester Goods Yard are considered suitable, ideally, only for fast walking, normally associated with business activities, during winter. However, conditions only marginally exceed the Lawson criterion for leisurely strolling and would likely be considered tolerable for pedestrian passage. Otherwise, surrounding conditions are suitable for at least leisurely strolling and are thus considered suitable for pedestrian passage.
- 11.44 Main entrances to the existing surrounding buildings enjoy suitable conditions for pedestrian ingress / egress.
- 11.45 The Marriott Hotel's outdoor seating area, adjacent to the River Irwell, is exposed to westerly winds but enjoys suitable conditions for long periods of outdoor sitting, such as for an outdoor café.
- 11.46 Factory Square (to the west of The Factory) enjoys suitable conditions for general recreational uses including at least short periods of sitting (such as for a meeting point). Suitable conditions for long periods of outdoor sitting (such as for picnics) are enjoyed across most of the Square during at least summer, with only a small area close to The Factory's west elevation being marginally windy for such activities.
- 11.47 Most of Festival Square (on the north side of and beneath The Factory) enjoys suitable conditions for recreational uses including at least short periods of sitting, with much of the space further suitable for long periods of outdoor sitting during at least summer. Channelling of prevailing southerly winds beneath The Factory's eastern overhang and around the north-eastern core creates conditions suitable for leisurely strolling but too windy for sedentary activities during autumn and winter. However, given the extent of area affected, the overall conditions across the square are expected to be tolerable for associated recreational uses.
- 11.48 The open space around the southwest corner of St John's T1 generally has suitable conditions for recreational activities including short periods of sitting from spring to autumn. Suitable conditions for long periods of sitting in summer, such as for an outdoor café, are limited to small areas close to the west and south frontages, away from the building corners. Purposely developed landscaping would therefore be required to create suitable conditions for planned uses.

- 11.49 The open space at St John's Place generally has suitable conditions for recreational activities including at least short periods of sitting in summer and autumn, though the southwest corner of the space is too windy for such activities during spring and winter. Overall, conditions are expected to be considered tolerable for associated temporary uses.

### Identification and Evaluation of Likely Significant Effects

#### Demolition and Construction Phase

- 11.50 There are no existing structures to be demolished within the Site.
- 11.51 During construction, the massing of neighbouring buildings and the spacing and orientation to the Proposed Development, including consented future developments, is such that potential short-term effects where partially completed buildings may exacerbate downdraughts from downwind buildings are not expected to be significant. Potential wind effects from the partially completed Development are therefore expected to be less than from the completed Development considered below.
- 11.52 Furthermore, pedestrian activities within the Site and immediate surrounds will also be different during construction, with pedestrian movements restricted by temporary hoardings. Pedestrian perception of conditions in the surrounding area is also likely to be affected by expectations of conditions around a building site, with pedestrians more likely to tolerate adverse conditions as they can appreciate it as a temporary situation.
- 11.53 On the basis of the above, the Proposed Development is expected to have a lesser effect on the suitability of wind conditions in and around the Site during construction than for the completed scheme and any potential additional effects of the demolition and construction phase are expected to be **negligible**.

#### Operational Phase

- 11.54 Upon completion, the Proposed Development presents a relatively wide obstruction to prevailing southerly winds, particularly the stronger south-south-westerly winds. The Development is partially sheltered at lower levels from these winds but is relative exposed at mid-to-upper levels. Downdraughts from the southerly elevation have potential to reach pedestrian level before channelling along the façade and around the southwest and southeast corners of the building. The downdraughts may extend some distance upwind towards The Factory and to the east (towards the T1 site), before channelling along Water Street, to the northeast of the Proposed Development.
- 11.55 The Proposed Development is more exposed to, but presents a narrow obstruction to, the most frequent extreme winds from the west-south-west and west. The building orientation helps limit the potential for downdraughts and subsequent channelling of resulting pedestrian level winds for these wind directions. Similarly, the Proposed Development is orientated to present a corner to north-easterly winds, common in spring, again limiting the potential for significant effects for these winds.
- 11.56 The landscaping and localised building features were developed during an interactive workshop to allow the Proposed Development to respond to the potential wind effects discussed above, and the proposed pedestrian and occupant activities. Resulting key features embedded into the design include:
- 4 m deep, 50% porous canopy, extending from south elevation at Level 1;
  - 6 – 8 m high trees, of a deciduous species with substantial retained solidity in winter (i.e. significant canopies with numerous branches):
    - along the north edge of the raised terrace;
    - along the edge of Canal Basin;
    - in a cluster to the west of Proposed Development's southwest corner; and

- in two columns across the open space between the Proposed Development and Factory Square.
- ~1.1 – 1.2 m high shrubs in planters:
  - on the north and south sides of main entrances; and
  - extending out from the southeast corner of Proposed Development.
- Two 2.4 m x 1.8 m wide, 50% porous, screens within the planter extending out from the Proposed Development's southeast corner;
- 1.8 m high, 50% porous gate, extending from the southwest corner of Proposed Development; and
- ~ 1.1 - 1.2 m high, 50% porous, barriers:
  - around the raised terrace edge;
  - along the level drop above the Canal Basin; and
  - along the waterfront.

11.57 The above features, as modelled, are illustrated in Appendix 11.1.

11.58 The pedestrian level wind environment in and around the Site resulting from the above effects and accounting for the designed-in features is presented in terms of the Lawson comfort and safety criteria in Appendix 11.1. Conditions are further summarised graphically in terms of likely suitability for pedestrian activities (based on the seasonal targets outlined in Table 11.3) in Figure 11.2. This presentation applies expert judgement to extrapolate from the key-point measurements in order to indicatively cover the Site and surrounding area.

#### **Pedestrian Safety (Baseline Surrounds)**

11.59 In the baseline surrounds scenario, without further mitigation, pedestrian level wind conditions generally rate as safe for all users. However, the following areas rate as unsuitable, in term of pedestrian safety, for the general public:

- at the northeast corner of the Site, extending across the Proposed Development's access road and onto Water Street (locations 50 and 112 in Figures A11.4 of Appendix 11.1); and
- at the southwest corner of the St John's T1 site, extending across the access road and potentially back onto Water Street (location 60 in Figures A11.4 of Appendix 11.1).

11.60 It is expected that conditions at Locations 50 and 60 will only marginally exceed the safety criteria: the assessed once per annum wind speed is approximately 15.6 m/s, against the criterion of 15.0 m/s; the 15 m/s threshold is exceeded approximately 1.5 times per annum, against a target of once per annum. Given the marginal exceedance of the criteria, in the absence of further mitigation, these effects are considered **moderate adverse**.

11.61 The exceedance of the safety criteria on the south side of the Proposed Development's access road (location 112) is slightly greater: the once per annum wind speed potentially exceeds 16 m/s and the 15 m/s threshold is potentially exceeded more than twice per annum. In the absence of further mitigation, this effect is considered **major adverse**, though very localised.

11.62 Mitigation of these exceedances is discussed at paragraphs 11.97 to 11.106 below.

11.63 Otherwise, conditions in and around the Site rate as safe for all users. The wider effect on pedestrian safety is therefore considered **negligible**, with a localised **moderate beneficial** effect at the junction of Water Street and the access road to Manchester Goods Yard.

#### **Pedestrian Comfort (Baseline Surrounds)**

##### **Thoroughfares**

11.64 In terms of pedestrian comfort, with respect to wind force, wind conditions at the northeast corner of the Site, extending across the Proposed Development's access road and along Water Street, are considered suitable only for fast walking, normally associated with business activities, during winter. The localised effect, around the access road (locations 50 and 112),

is considered **moderate adverse**. Further along Water Street, above the Canal Basin (location 111), the conditions only marginally exceed the Lawson criterion for leisurely strolling and are expected to be considered tolerable for pedestrian passage. This localised effect is therefore considered **minor adverse**.

- 11.65 Otherwise, conditions within the Site are suitable for at least leisurely strolling and are thus considered suitable for pedestrian access to, and passage through or past, the Site. The wider effect on thoroughfares within the Site is therefore considered **negligible**.

### ***Building Entrances***

- 11.66 The main entrances to the Proposed Development are located away from areas of potential accelerated winds or a locally sheltered. As a result, conditions at the Proposed Development's main entrances are suitable for pedestrian ingress / egress. The effect on the Proposed Development's entrances is therefore considered **negligible**.

### ***Amenity Spaces***

- 11.67 Most of the raised terrace around the north, west and south sides of the Proposed Development enjoys suitable conditions for recreational activities including long periods of outdoor sitting, such as for café outdoor seating, during at least summer and autumn. The west and south sides of the tower also enjoy these amenable conditions in spring. The north side of the tower is marginally windy, but likely tolerable, for outdoor seating during spring. The areas around the tower's southwest and northwest corners are too windy for outdoor seating. However, overall, the conditions are considered suitable for proposed uses and the small limitation on potential seating areas is not considered significant. The overall effect on the proposed terrace is therefore deemed **negligible**.
- 11.68 The open space on the south side of the Proposed Development is susceptible to some downdraughts from the tower. Summer conditions are suitable for recreational activities including short periods of sitting or standing, such as for a meeting point or children's play. Conditions from autumn to spring, whilst suitable for leisurely strolling, are considered too windy for sedentary activities across much of the space. However, given the open nature of this space, conditions are expected to be considered tolerable and this effect is therefore considered **minor adverse**.
- 11.69 The area around the Canal Basin enjoys suitable conditions for recreational activities, including at least short periods of sitting or standing from spring through to autumn, with much of the space further suitable for long periods of outdoor sitting during at least summer. Overall, conditions are expected to be suitable for proposed uses and this effect is therefore considered **negligible**.

### ***Surrounding Area***

- 11.70 With the introduction of the Proposed Development, conditions on the thoroughfares around the southwest corner of the St John's T1 site are suitable only for fast or business walking during winter. The localised effect around the access road (location 60 in Figures A11.4 of Appendix 11.1) is considered **moderate adverse**. Further along Water Street (location 59) the conditions only marginally exceed the Lawson criterion for leisurely strolling and are expected to be considered tolerable for pedestrian passage. This localised effect is therefore considered **minor adverse**.
- 11.71 Otherwise, conditions in the immediate surrounding area are suitable for at least leisurely strolling and would be considered suitable for pedestrian access to and passage past the Site. The Proposed Development therefore has a localised **minor beneficial** effect at the junction of Water Street and the access road to Manchester Goods Yard. The wider effect on surrounding thoroughfares is considered **negligible**.

- 11.72 The main entrance to the consented St John's T1 development is marginally windy, but likely tolerable, for pedestrian ingress / egress during winter. This localised effect is considered **minor adverse**. Otherwise, entrances to surrounding buildings are expected to retain suitable conditions for pedestrian ingress / egress and the wider effect on surrounding entrances is considered **negligible**.
- 11.73 The Marriott Hotel's outdoor seating area, adjacent to the River Irwell, retains suitable conditions for café outdoor seating. Factory Square retains suitable conditions for recreational uses, including outdoor seating during at least summer across the Square. The slight enhancement at the west elevation of The Factory is not considered significant and these effects are both considered **negligible**.
- 11.74 Most of Festival Square retains suitable conditions for recreational uses including at least short periods of sitting, particularly from spring through to autumn. The area along the north elevation of The Factory is further suitable for outdoor seating during at least summer. Relative to the Baseline conditions, the area with suitable summer conditions for outdoor seating is reduced in the north area of the Square but extended in the east. The area susceptible to channelling of prevailing southerly winds beneath The Factory, with resulting conditions suitable for leisurely strolling but too windy for sedentary activities in winter, is slightly increased around the north-eastern core but autumn conditions closer to the core are enhanced relative to Baseline conditions. Overall, this mix of effects is considered **negligible** to no worse than **minor adverse**.
- 11.75 The Proposed Development has a mixed effect on the area in the southwest of St John's T1. The extent of the open space with suitable conditions for general recreational activities, including short periods of sitting (such as for a meeting point), during summer is reduced and conditions in the open space are too windy for sedentary activities from autumn to spring. However, the area with suitable conditions for long periods of sitting (such as for an outdoor café) is extended, though remains limited to small areas close to the west and south frontages, away from the building corners. Purposely developed landscaping would still therefore be required to create suitable conditions for planned uses and the effects are considered to range from **minor adverse** (in the open space, set back from the roadway considered as thoroughfare, above) to **minor beneficial** (at the building frontage).
- 11.76 The open space at St John's Place is slightly enhanced relative to Baseline conditions, with resulting conditions suitable for recreational activities including at least short periods of sitting throughout the year. This effect is considered **negligible** to localised **minor beneficial** (towards the southwest corner).

### Cumulative Effects

- 11.77 With the introduction of identified cumulative developments, including the Union T1 scheme that will replace the St John's T1 development, the Proposed Development enjoys greater shelter from prevailing southerly winds and is significantly sheltered from the most frequent strong winds from the west-south-west and west.
- 11.78 The St John's Place Zone 1 tower development represents a substantial structure with potential to create areas of accelerated pedestrian level winds within the area surrounding the tower. The current assessment has considered only the illustrative canopies and landscaping presented within the latest relevant planning application for this development and does not include further mitigation measures which are expected to be developed during the detailed design stages for this plot to address the planning condition requiring submission of a final wind mitigation scheme.
- 11.79 Although sheltered at lower levels, the St John's Place tower is exposed to both prevailing southerly winds and north-easterly winds, common in spring. Downdraughts from the mid-to-upper levels of the south and north elevations have potential to spill over the southern canopy

and northern podium, respectively, reaching pedestrian level to the southwest of the tower, by Water Street.

- 11.80 The resulting pedestrian level wind conditions in and around the Site is presented in terms of the Lawson comfort and safety criteria in Appendix 11.1, and is summarised below.

#### **Pedestrian Safety (Future Surrounds)**

- 11.81 As a result of the wind effects discussed above, pedestrian level wind conditions rate as unsuitable, in terms of pedestrian safety, for the general public around the southwest of the St John's Place tower. However, the accelerated winds are dictated by downdraughts from St John's Place tower, particularly from the northern elevation for north-easterly winds. This is not therefore considered a combined effect of the Proposed Development with this future development.
- 11.82 The exceedances of the safety criteria identified at paragraphs 11.59 to 11.61 are removed in the cumulative scenario.
- 11.83 The cumulative effects of the Proposed Development with the future surrounding developments on pedestrian safety at ground level is therefore expected to be generally **negligible**, with a localised **moderate beneficial** effect at the junction of Water Street and the access road to Manchester Goods Yard.

#### **Pedestrian Comfort (Future Surrounds)**

##### ***Thoroughfares***

- 11.84 Wind conditions within the Site are suitable for at least leisurely strolling and are thus considered suitable for pedestrian access to, and passage through or past, the Site. The cumulative effect on thoroughfares within the Site is therefore considered **negligible**.

##### ***Building Entrances and Waiting Areas***

- 11.85 Conditions at the Proposed Development's main entrances are suitable for pedestrian ingress / egress. The cumulative effect on the Proposed Development's entrances is therefore considered **negligible**.

##### ***Amenity Spaces***

- 11.86 Most of the raised terrace around the north, west and south sides of the Proposed Development enjoys suitable conditions for recreational activities including long periods of outdoor sitting, such as for café outdoor seating, from spring through to autumn. The areas around the tower's southwest and northwest corners are too windy for outdoor seating. However, overall, the conditions are considered suitable for proposed uses and the small limitation on potential seating areas is not considered significant. The overall cumulative effect on the proposed terrace is therefore deemed **negligible**.
- 11.87 The open space on the south side of the Proposed Development is suitable for general recreational activities including short periods of sitting or standing, such as for a meeting point, from spring through to autumn. These conditions would also be considered suitable for activities such as a children's play space for example. Summer conditions are considered too windy for long periods of outdoor sitting, such as for picnics. However, given the open nature of this space, conditions are overall expected to be considered tolerable and this cumulative effect is therefore considered no worse than **minor adverse**.
- 11.88 The area around the Canal Basin enjoys suitable conditions for recreational activities, including at least short periods of sitting or standing throughout the year, with amenable conditions for long periods of outdoor sitting during at least summer. Conditions are therefore

expected to be suitable for proposed uses and this cumulative effect is therefore considered **negligible**.

### ***Surrounding Area***

- 11.89 Within the surrounding area, conditions to the southwest of the St John's Place tower are considered suitable, ideally, only for fast or business walking during winter but are only marginally windy for leisurely strolling and are expected to be considered tolerable. However, as discussed above, these accelerated winds are expected to be dictated by the St John's Place tower and are not considered to represent a combined effect of the Proposed Development with this future development. There is also a planning condition attached to the St. John's Place Planning Permission requiring submission of a final wind mitigation scheme to address this point.
- 11.90 Otherwise, thoroughfares in the immediate surrounding area are suitable for at least leisurely strolling and are considered suitable for pedestrian access to and passage past the Site. On this basis, the cumulative effects of the Proposed Development with future surrounding developments on pedestrian comfort on surrounding thoroughfares is expected to be localised **minor beneficial** at the junction of Water Street and the access road to Manchester Goods Yard and **negligible** elsewhere.
- 11.91 Entrances to surrounding buildings are expected to enjoy suitable conditions for pedestrian ingress / egress. The cumulative effect on surrounding entrances is therefore considered **negligible**.
- 11.92 The Marriott Hotel's outdoor seating area retains suitable conditions for café seating. Factory Square retains suitable conditions for recreational uses, including outdoor seating during at least summer across the Square. The slight enhancement at the west elevation of The Factory is not considered significant and these cumulative effects are both considered **negligible**.
- 11.93 Festival Square enjoys suitable conditions for recreational uses including at least short periods of sitting, such as for a meeting place, throughout the year, with much of the space further suitable for long periods of outdoor sitting during at least summer. Relative to the Baseline conditions, the area with suitable summer conditions for outdoor seating is slightly reduced in the north area of the Square but extended in the east. The channelling of prevailing southerly winds beneath The Factory's eastern overhang and around the north-eastern core is also alleviated. Overall, the cumulative effect is considered **negligible**.
- 11.94 The Union T1 development incorporates purposely developed wind mitigation measures and enjoys suitable conditions for long periods of outdoor sitting, such as for café outdoor seating, across the south side of the tower, during at least summer. The open space in the southwest of the T1 site is suitable for general recreational activities including short periods of sitting (such as for a meeting point), from spring through to autumn. Conditions are considered suitable for proposed used and this cumulative effect is therefore considered **negligible**.
- 11.95 The sheltered amenity space beneath the canopy on the south side of St John's Place tower has suitable conditions for general recreational activities, such as a play space. Further development of the landscaping proposal is therefore expected to be required to ensure suitable conditions for planned recreational activities, including outdoor seating. However, these conditions are expected to be dictated by St John's Place tower and the cumulative effect of the developments is expected to be **negligible**.
- 11.96 Salford Central Zone C, to the northwest of the Site (on the opposite side of the River Irwell), enjoys suitable conditions for general recreational activities along the waterfront, from spring through to autumn, with much of the space further suitable for outdoor seating in at least summer. In the absence of landscaping measures, the podium-top terrace is marginally windy for outdoor seating during summer. However, with inclusion of the landscaping proposals,

conditions would be expected to be acceptable. The likely cumulative effect on Salford Central Zone C is therefore considered **negligible**.

### Mitigation Measures

- 11.97 Development of the landscaping proposals to help alleviate anticipated wind effects has been carried out and measures implemented are accounted for in the assessment discussed above.
- 11.98 Further mitigation is not required in the cumulative scenario.
- 11.99 The existing surrounds scenario requires more detailed discussion.
- 11.100 Firstly, the existing surrounds scenario incorporates the consented St John's T1 development with its illustrative landscaping, which is relatively sparse along Water Street. The consented St John's T1 will not be delivered; the site is now under the ownership of the Applicant who is progressing alternative proposals on the site, referenced in this document as Union T1. The existing surrounds scenario will not therefore materialise.
- 11.101 The Union T1 proposals incorporate significantly denser tree planting, staggered porous screens and planters with tall shrub planting to help mitigate wind impacts along Water Street. These mitigation measures have been tested as part of the cumulative assessment. As detailed above, the cumulative scenario including these measures resolves the safety exceedances identified for the existing surrounds scenario. Furthermore, as both developments are in the same ownership, there is opportunity to further develop an integrated solution between both sites, if this were to be necessary.
- 11.102 To inform this a further mitigation workshop was carried out, considering the Proposed Development with interim surrounds comprising the proposed Union T1 and existing surrounds elsewhere, as representative of the most likely potential worst-case scenario.
- 11.103 The key potential additional mitigation measures are as follows:
- 4 m high, 50% porous, upstand added at east end of the south elevation canopy;
  - Water Street re-aligned with east elevation planters removed and five 4 – 6 m high trees added along the east side of the Proposed Development;
  - Footpath above the Canal Basin re-aligned and four large trees proposed at the wall replaced with three smaller (4 – 6 m high) trees and two 2.4 m x 1.8 m wide, 50% porous, screens closer to Water Street;
  - Third column of 6 – 8 m high trees added in the open space between the Proposed Development and Factory Square; and
  - Five 2.4 m high x 1.5 m wide, 50% porous, screens added along east side of Water Street, within the T1 site.

The trees listed above are assumed to be a deciduous species with substantial retained solidity in winter (i.e. significant canopies with numerous branches).

- 11.104 The above features, as modelled, are illustrated in Appendix 11.1. The resulting pedestrian level wind conditions in and around the Site are also presented in terms of the Lawson comfort and safety criteria in Appendix 11.1.

- 11.105 A planning condition is anticipated on both consents that requires further wind tunnel testing and validation prior to development of either building, if the above features are not implemented. This would be in common with other consents in the St John's area, in recognition of the evolving physical context and the need for a holistic approach that delivers a suitable wind environment across the regeneration area.
- 11.106 Even in the very highly unlikely event that the implemented St John's T1 development is progressed rather than the revised Union T1 development, and if no other committed development has come forward in the interim period, the same outstanding planning condition attached to that consent requires development of the illustrative landscaping proposals for wind mitigation prior to occupation of the building.

### Residual Effects

- 11.107 As discussed above, development of the landscaping and localised building features, to help alleviate anticipated wind effects, has been carried out and measures implemented are accounted for in the assessments. In the absence of further pedestrian level wind mitigation measures, residual conditions with the existing surrounding context would therefore be as discussed in paragraphs 11.59 – 11.76.
- 11.108 However, at the very least, the consented St John's T1 will be replaced with the revised Union T1 development on that site. This is expected to provide opportunities for further wind mitigation measures in the open space between the developments and details of potential measures, developed through further wind tunnel testing, are presented in paragraph 11.103. These potential additional mitigation measures are effective in alleviating the accelerated winds along Water Street, around the northeast of the Site and at the southwest of the St John's T1 site, such that residual conditions in and around the Site rate as safe for all users. In the unlikely event that no other committed development, other than the Proposed Development and Union T1 has come forward, the resulting effects on pedestrian safety therefore have potential to be **negligible** (the marginal exceedance of the safety criteria at the junction of Water Street and the access road to Manchester Goods Yard, for the baseline conditions, is not expected to occur with the proposed Union T1, rather than the consented St John's T1, and there is therefore no significant beneficial effect of the Proposed Development at this location)..
- 11.109 In terms of pedestrian comfort, during winter, conditions on Water Street, directly between the Proposed Development and Union T1, are considered suitable (ideally) only for fast walking, normally associated with business activities. Similar conditions occur around the northeast corner of the Proposed Development, on the access road. However, in both cases the conditions only marginally exceed the Lawson criterion for leisurely strolling and are expected to be considered tolerable for pedestrian passage. These localised residual effects are therefore considered **minor adverse**.
- 11.110 Otherwise, conditions in and around the Site are suitable for at least leisurely strolling and would be considered suitable for pedestrian access to and passage past the Site. The wider residual effect on thoroughfares is therefore considered **negligible** (again, the slightly windy, but tolerable, baseline conditions at the junction of Water Street and the access road to Manchester Goods Yard are not expected with the proposed Union T1, rather than the consented St John's T1, and there is therefore no significant beneficial effect at this location).

- 11.111 The removal of the planters on the east side of the Proposed Development does result in slightly windy, but likely tolerable, conditions for pedestrian ingress / egress at the main entrance to the Development. The potential secondary entrance at the northeast corner is not expected to be as windy as reported for the access road but is still likely to be slightly windy for comfortable pedestrian ingress / egress. Similar conditions also occur at the main entrance to the proposed Union T1 building. These residual effects are considered **minor adverse**.
- 11.112 Conditions at remaining entrances to the Proposed Development and surrounding buildings are expected to be suitable for pedestrian ingress / egress and the wider effect on building entrances is therefore considered **negligible**.
- 11.113 Overall, the effect on amenity spaces within the Site and within the immediate surrounding area are similar to those discussed above for the Proposed Development with the existing surrounding context, and residual effects on amenity spaces are therefore expected to range from **minor beneficial** to **minor adverse**.
- 11.114 If further mitigation were required between the Proposed Development and the proposed Union T1, which are both within the Applicant's control, then further development of the landscaping, as part of the site-wide strategy for the wider St John's regeneration area, could therefore be implemented to alleviate the accelerated winds.
- 11.115 All planning permissions granted within the St John's regeneration area are subject to the same planning condition requiring further wind tunnel testing prior to occupation of the building. This is in recognition of the rapidly evolving physical context of the area and the need for a holistic wind mitigation strategy across the regeneration area. Unless the mitigation features as outlined above (both designed-in feature as per paragraph 11.56 and additional measures as per paragraph 11.103) are implemented, without significant further changes, it is anticipated that the same condition would be applied to any planning permission for the Proposed Development.
- 11.116 With the introduction of consented future surrounding developments, the Proposed Development is significantly sheltered from key wind directions, further reducing the significance of effects. Resulting effects are generally **negligible** with some localised effects ranging from **moderate beneficial** to **minor adverse**.
- 11.117 Consequently, it is expected that the landscaping features detailed in paragraph 11.56 could potentially be reduced should some or all of these wider developments have progressed prior to completion of the Proposed Development. The additional mitigation measures outlined in paragraph 11.103 would not be required.
- 11.118 As with all developments across St John's, further wind microclimate assessment should be undertaken at that time as part of a site wide analysis to confirm the optimum wind mitigation strategy across the regeneration area.

**Table 11.4 Residual Impact Summary**

| Impact                                                     | Description of Effect                                                            | Pre-mitigation Significance                               | Post-mitigation Significance                           |
|------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------|
| Pedestrian safety                                          | Creation or alleviation of accelerated pedestrian level winds along Water Street | Localised moderate beneficial to localised major adverse. | Localised moderate beneficial to negligible.           |
|                                                            |                                                                                  | Long-term moderate beneficial (with future surrounds).    | Long-term moderate beneficial (with future surrounds). |
| Comfort for pedestrian access to and passage past the Site | Creation of accelerated pedestrian level winds along Water Street                | Moderate to minor adverse                                 | No worse the minor adverse                             |

|                                                                     |                                                                                            |                                                                                                                        |                                                                                                                     |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|                                                                     |                                                                                            | Long-term negligible (with future surrounds)                                                                           | Long-term negligible (with future surrounds)                                                                        |
| Comfort for pedestrian ingress / egress at entrances to Development | None                                                                                       | Negligible                                                                                                             | Negligible to minor adverse                                                                                         |
| Comfort for recreational use of proposed amenity spaces             | Some restrictions on potential use of open space on south side of the Proposed Development | Minor adverse                                                                                                          | Minor adverse                                                                                                       |
| Comfort for existing activities within surrounding area             | Changes to wind conditions at surrounding thoroughfares, entrances and amenity spaces      | Minor beneficial to moderate adverse<br><br>Long-term localised minor beneficial to negligible (with future surrounds) | Minor beneficial to minor adverse<br><br>Long-term localised minor beneficial to negligible (with future surrounds) |

## Non-Technical Summary

- 11.119 The Proposed Development introduces a significant structure with regards to potential wind effects. Consequently, wind tunnel testing of a physical scale model has been combined with long-term wind statistics from Manchester Airport (corrected to apply at the Site) to provide a detailed assessment of pedestrian level wind conditions in and around the Site, in accordance with the industry standard Lawson criteria for pedestrian comfort and safety.
- 11.120 Based on the climate statistics, light to moderate winds from the south and south-south-east are most common at the Site, whilst stronger winds more frequently blow from the south-south-west. Winds from the west-south-west and west also occur frequently, and extreme winds are most likely to blow from this direction. North-easterly winds are also common during spring.
- 11.121 Baseline wind conditions rate (marginally) as unsafe for the general public and are slightly windy, in terms of pedestrian comfort, for leisurely strolling at the junction of Water Street and the access road to Manchester Goods Yard, due primarily to accelerated winds emanating from the consented St John's T1 development. Otherwise, conditions in and around the Site rate as safe for all users and are comfortable for at least pedestrian passage. Main entrances to surrounding buildings enjoy suitable conditions for pedestrian ingress / egress. Amenity spaces in and around the Site generally have suitable or at least tolerable conditions for associated activities, though purposely developed landscaping would be required to create acceptable conditions in the south / southwest of the consented St John's T1 development.
- 11.122 Upon completion, the Proposed Development will represent a significant structure and, in the context of existing surrounding buildings, is relatively exposed at mid-to-upper levels to prevailing southerly winds. The Proposed Development is more exposed, but better orientated, to the most frequent extreme winds from the west-south-west and west. The landscaping and localised building features have therefore been developed to help alleviate resulting accelerated pedestrian level winds.
- 11.123 With these measures implemented, pedestrian level wind conditions rate as unsafe for the general public around the northeast corner of the Site (across the access road and onto Water Street) and at the southwest corner of the St John's T1 site. These effects range from localised **major adverse** to **moderate adverse**. Conditions are however improved at the junction of Water Street and the access road to Manchester Goods Yard, representing a **moderate beneficial** effect. Otherwise, conditions in and around the Site remain rated as safe for all users and the wider effect on pedestrian safety **negligible**.
- 11.124 However, these effects consider the consented St John's T1 which is unlikely to proceed and would require further development of the associated landscaping proposals if it did. The currently proposed Union T1 development represents a more likely scenario on initial occupation of the Proposed Development. As both developments are in the same ownership, there is therefore opportunity to further develop an integrated solution between both sites, if this were to be necessary. To inform this, further wind tunnel testing was carried out, considering the Proposed Development with interim surrounds comprising the proposed Union T1 and existing surrounds elsewhere. These test demonstrated that further development of the landscaping, as part of the site-wide strategy for the St John's regeneration area, has potential to further alleviate the accelerated winds such that effects on pedestrian safety are expected to be **negligible**.
- 11.125 In terms of pedestrian comfort, the residual effects on thoroughfares, entrances and amenity spaces both within the Site and in the surrounding area are expected to be mainly **negligible** and no worse than localised **minor adverse**, with some localised **minor beneficial** effects.
- 11.126 With the introduction of the proposed Union T1 and consented future surrounding developments, the Proposed Development is significantly sheltered from key wind directions

and current landscaping proposals are sufficient to ensure that pedestrian level conditions in and around the Site rate as safe for all users. In terms of pedestrian comfort, conditions within the Site are expected to be mainly suitable for proposed uses, with only the open space on the south side of the Proposed Development marginally windy but tolerable for associated recreational uses. No significant adverse effects on surrounding conditions are expected.

- 11.127 No significant additional construction effects over and above those for the completed Development are expected.



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