FINAL REPORT

STATION HILL - PLOT E AND F

READING, UK

PEDESTRIAN LEVEL WIND MICROCLIMATE ASSESSMENT

RWDI #1803688 PLW REV-C

15TH FEBRUARY 2019

ON BEHALF OF

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VERSION HISTORY

RWDI Project #1803688	Station Hill Reading, UK	
Report	**Releases**	**Dated**
Reports	Rev A	24th January 2019
	Rev B	31st January 2019
	Rev C	15th February 2019
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1. EXECUTIVE SUMMARY

Physical wind tunnel testing of plots E and F of the Reading Station Hill development was undertaken to comply with the requirements of condition 18 of the planning permission. The objective of this study was to determine the ground, terrace and balcony levels wind environment within and around the Proposed Development in Reading, UK.

This report presents a description of the methodology used and the results of four configurations tested in the wind tunnel, namely:

- Configuration 1: Existing Baseline comprising the existing Site incorporating the Temporary Events Space with existing surrounding buildings;
- Configuration 2: Proposed Development without Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place;
- Configuration 3: Proposed Development with Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place and wind mitigation measures; and
- Configuration 4: Cumulative Scenario comprising the Reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters but with Plot B in accordance with the reserved matters consent for that plot) plus Cumulative Surrounds.

The meteorological data for the Site indicate strong prevailing winds from the south-west quadrant throughout the year with secondary winds from the north-east direction which are more prevalent during the spring months.

All locations in and around the Existing Site (Configuration 1) have wind conditions generally suitable for the intended use.

With the introduction of the Proposed Development devoid of any landscaping, windier conditions arise across the Site. Wind conditions exceeding the pedestrian comfort criteria occuring at thoroughfares and terrace amenity spaces in and around the Proposed Development. These occur across the northern site, at thoroughfare locations around Plots A and B (Locations 51, 54, 80 and 81) and on the roof terraces of Plot E (Locations 167, 168, 173 and 174)..

As such, areas where wind mitigation measures are required have been identified as existing and proposed thoroughfares within the northern part of the Site and the roof terraces of Plot E.

Mitigation measures on the roof terraces of Plot E were developed through further wind tunnel testing. They comprise:

- Porous screens, approximately 1.2m tall and 50% porous on the roof terraces; and
- Shrubs, approximately 1.2m tall on the roof terraces.

Wind mitigation measures for the northern part of the Site will be developed with the detailed design of the northern Site, including Plot A.

With the mitigation measures in place (Configuration 3) wind conditions are improved on the roof terrace of Plot E. As such, it has been identified that in order to achieve wind conditions suitable for amenity space use on the terraces, landscaping in the form of porous screens or shrubs around the sitting areas would be required. Further landscaping now proposed on the roof terraces are anticipated to alleviate the localised remaining windy conditions.

Conditions exceeding the pedestrian safety and comfort criteria persist across the northern site; wind mitigation measures would be required when the detailed design of the northern site comes forward.

With the introduction of cumulative surrounding building including the detailed design of Plot B and in the absence of wind mitigation measures, wind conditions across the Site are improved. All locations become suitable in terms of pedestrian safety and conditions exceeding the pedestrian comfort criteria at ground level persist at a single location, to the east of Plot B (location 80). There are areas at terrace levels where the pedestrian comfort criteria are exceeded (Locations 167, 168 and 173). Wind mitigation measures would be required in the northern site and will be implemented when its detailed design comes forward.

2. INTRODUCTION

RWDI was retained by CallisonRTKL to conduct a pedestrian level wind microclimate assessment for the Proposed Development in Reading, UK. This report presents the background, objectives, results and discussion from RWDI's assessment. A discussion of the overall results from the study is presented in Section 6, "Conclusion".

3. BACKGROUND AND APPROACH

Wind tunnel tests were conducted on a 1:300 scale model of the Proposed Development in Reading. The investigation quantifies the wind conditions within and around the Site, by comparing the measured wind speed and frequency of occurrence with the Criteria. Meteorological data for Reading has been analysed from the London Heathrow meteorological station, and adjusted to the Site conditions by modelling the effect of terrain roughness on the wind speeds approaching the Site.

Measurements were taken at up to 181 locations for 36 wind directions, in 10° increments. The measurements covered ground level locations along the building facades and at corners, near main entrances, on pedestrian routes within and around the Site, roof top terraces and balconies. Analysis was conducted on a seasonal basis but the report focuses on the windiest season results (i.e. winter) and those for the summer season, when pedestrian activity generally requires calmer conditions.

This report presents a description of the methodology used and the results of four configurations tested in the wind tunnel, namely:

- Configuration 1: Existing Baseline comprising the existing Site incorporating the Temporary Events Space with existing surrounding buildings;
- Configuration 2: Proposed Development without Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place;
- Configuration 3: Proposed Development with Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place and wind mitigation measures; and
- Configuration 4: Cumulative Scenario comprising the Reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters but with Plot B in accordance with the reserved matters consent for that plot) plus Cumulative Surrounds.

3.1 Site Description and Surroundings

The Site is located in Reading and the OS Landranger Grid Reference to the Site is SU714737.

The Site is located approximately 100m to the south of Reading Train Station. It is bound by Garrard Street to the north, buildings on Greyfriars Road to the west, Friars Street to the south and buildings to the east.

The surrounding area is generally low- to mid-rise residential. Further afield, the surrounding area is generally low-rise suburban residential, which is typically characterised by lower mean wind speeds and stronger gusts, when compared with open country.

As such, the Site is relatively exposed to oncoming prevailing south westerly winds above ~15m in height, which can proceed unimpeded towards the Site.

3.2 The Proposed Development

The Proposed Development consists of two residential blocks, Block E to the west and Block F to the east of the Site. Block E consists of three towers, ranging from 5 storeys to 11 storeys and linked by large podiums, whilst Block F is a single tower, rising 12 storeys above ground level.

There are amenity spaces on the podiums of Block E and on the roof terraces of both Blocks E and F.

Figure 1: Site Location with the approximate Site highlighted in yellow.

4. METHODOLOGY AND ASSESSMENT CRITERIA

Wind tunnel testing is the most well-established and robust means of assessing the pedestrian wind microclimate. It enables the wind conditions at the Site to be quantified and classified in accordance with the Criteria. To produce the results within the tunnel, a 1:300 scale model was constructed which included the existing buildings at the Site and the surrounding area within a 360 metre (m) radius of the model target (centre).

The basic methodology for quantifying the pedestrian level wind environment is outlined below:

1. Measure the wind speeds at pedestrian level in the wind tunnel relative to a reference wind speed;

2. Adjust standard meteorological data to account for conditions at the Site;

3. Combine these to obtain the expected frequency and magnitude of wind speeds at pedestrian level; and

4. Compare the results with the Criteria to 'grade' conditions around the Site.

4.1 Simulation of Atmospheric Winds

The wind is turbulent, or gusty, and this turbulence varies depending upon the Site. It is necessary to reflect these differences in the wind tunnel test. In addition, the atmospheric boundary layer is a shear flow which means that the mean wind speed increases with height. Modelling these effects is achieved by a combination of spires and floor roughness elements to create a naturally-grown boundary layer that is representative of urban or open country conditions, as appropriate. The detailed contoured proximity model around the Site is used to fine-tune the flow and create conditions similar to those expected at full scale (as shown in Figure 2).

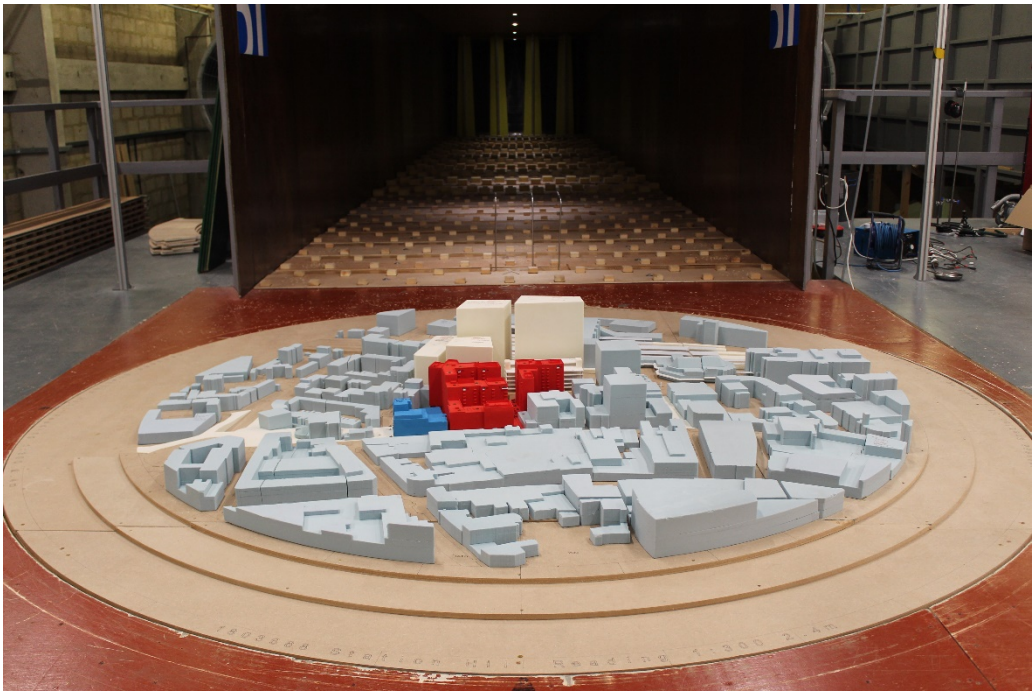


Figure 2: Proposed Development without Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place. (View in the wind tunnel from south)

4.2 Measurement Technique

Wind speed measurements were made using Irwin probes. For pedestrian comfort studies, both the mean wind speed and the peak wind speed are measured at selected locations at the Site and surrounding area to represent sensitive receptors, such as entrances, amenity areas and thoroughfares, at a scaled height of 1.5m above ground level. The typical equivalent full-scale time period for measuring the mean wind speed is around 90 minutes, whereas the peak wind speed is taken as the wind speed exceeded for 1% of the time.

Wind speed at each location was measured for 36 wind directions in 10° increments, with 0° representing wind blowing from the north and 90° wind blowing from the east.

4.3 Scaling

The length scale of the model was 1:300 and the velocity scale was approximately 1:2 for strong winds. Consequently, the time scale for the tests was 1:150, or in other words 1 second in the wind tunnel is equivalent to 150 seconds at full scale.

4.4 Meteorological Data

Approximately 30 years of meteorological data for Reading (gathered from the London Heathrow meteorological station) was used in this report and is presented in Appendix B as wind roses by season. The radial axis indicates the directional distribution of winds. The seasons are defined as spring (March, April and May), summer (June, July and August), autumn (September, October and November) and winter (December, January and February). The data has been corrected to standard conditions of 10m above open flat level country terrain, over which pedestrian level wind speeds are greatest.

The combined wind data derived from meteorological station of London airports has been corrected to standard conditions of 10m above open flat level country terrain. The meteorological station data are then adjusted to site conditions by assessing the terrain in all directions around the Development using the methodology implemented in the BREVe3 software package. Pedestrian level wind speeds at open, flat, level country terrain are typically greater than at an inner city environment with low to medium rise buildings, due to the difference in boundary layer thickness for the vertical wind profile. Hence roughness lengths, a parameter for the wind profile equations that specifies the type of terrain, were estimated in all directions for appropriate upwind distances by use of virtual geographical software, and input into calculations for the wind profiles.

The meteorological data indicate that the prevailing wind direction throughout the year is from the south-west, which is consistent feature of met stations within the London area.

The combination of meteorological data and velocity ratios permits the percentage of time that wind speeds are exceeded on the site to be evaluated. The locations can then be assessed using the Criteria, as described below.

4.5 Pedestrian Comfort

The assessment of the wind conditions requires a standard against which the measurements can be compared. This report uses the Lawson Comfort Criteria, which have been established for over thirty years. The Criteria, which seek to define the reaction of an average pedestrian to the wind, are described in Table 1. If the measured wind conditions exceed the threshold wind speed for more than 5% of the time, then they are unacceptable for the stated pedestrian activity and the expectation is that there may be complaints of nuisance or people will not use the area for its intended purpose.

The Criteria sets out four pedestrian activities and reflect the fact that less active pursuits require more benign wind conditions. The four categories are sitting, standing, strolling and walking, in ascending order of activity level, with a fifth category for conditions that are uncomfortable for all uses. In other words, the wind conditions in an area for sitting need to be calmer than a location that people merely walk past.

The distinction between strolling and walking is that in the strolling scenario pedestrians are more likely to take on a leisurely pace, with the intention of taking time to move through the area, whereas in the walking scenario pedestrians are intending to move through the area quickly and are therefore expected to be more tolerant of stronger winds.

The Criteria are derived for open air conditions and assume that pedestrians will be suitably dressed for the season. Thermal comfort is discussed with reference to acceptable wind environments but not evaluated as part of the assessment.

The coloured key in Table 1 corresponds to the presentation of wind tunnel test results described later in this report.

Table 1: Lawson Comfort Criteria

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

4.6 Strong Winds

Lawson[1] also specified a lower limit strong wind threshold when winds exceed 15m/s for more than 2.2 hours of the year. Exceedance of this threshold may indicate a need for remedial measures or a careful assessment of the expected use of that location; 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 2 hours of the year represent a safety issue for all members of the population, which would require mitigation to provide an appropriate wind environment.

Strong winds are generally associated with areas which would be classified as acceptable for walking or as uncomfortable. In a mixed-use urban development scheme, walking and uncomfortable conditions would not usually form part of the 'target' wind environment and would usually require mitigation due to pedestrian comfort considerations. This mitigation would also reduce the frequency of, or even eliminate, any strong winds.

[1] Lawson T.V. (April 2001), Building Aerodynamics, Imperial College Press

5. RESULTS

5.1 Details of Analysis

To account for the difference in height and terrain roughness between meteorological conditions at the airports and the Site, it is necessary to apply adjustment factors to the wind tunnel velocity ratios. Adjustment factors (mean factors) were computed for wind directions from 0° through to 360°. The reference height in the wind tunnel was at the equivalent full-scale height of 120 metres. Table 2 presents the mean factors for the Site.

Table 2: BREVe3 mean factors at 120m above ground level

Wind Direction	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
Mean Factor at 120 m	1.41	1.42	1.44	1.43	1.39	1.45	1.46	1.51	1.46	1.41	1.41	1.40

5.2 Desired Pedestrian Activity around the Development

Generally, for the Development, the target conditions are:

1. Strolling during the windiest season on pedestrian thoroughfares;
2. Standing conditions at main entrances, drop off areas or taxi ranks, and bus stops throughout the year; and
3. Sitting conditions at outdoor seating and amenity areas during the summer season when these areas are more likely to be frequently used by pedestrians.

The walking and uncomfortable classifications are usually avoided because of their association with occasional strong winds, unless they are on a minor pedestrian route or a route where pedestrian access could be controlled in the event of strong winds.

Achieving a sitting classification in the summer usually means that the same receptor would be acceptable for standing in the windiest season because winds are stronger at this time.

This is considered an acceptable occurrence for the majority of external amenity spaces because other factors such as air temperature and precipitation influence people's perceptions about the 'need' to use seating in the windiest season.

It should be noted that a mixture of sitting use and standing use is acceptable for larger amenity spaces, should designated seating not be located at the windier locations suitable for standing use. Furthermore, standing use conditions are also considered tolerable at private amenity areas (such as balconies) where the occupant has control over the use of the space.

5.3 Performance against the Lawson Criteria

The wind microclimate within and around the Site has been assessed and classified using the Lawson Criteria defined in Table 1. Significant features of the proposed landscaping scheme required for suitable wind conditions are shown in Appendix A.

5.4 Occurrence of Strong Winds

Strong winds exceeding 15m/s for more than 2.2 hours per year are listed in Table 3 below.

Table 3: Annual exceedance of strong winds

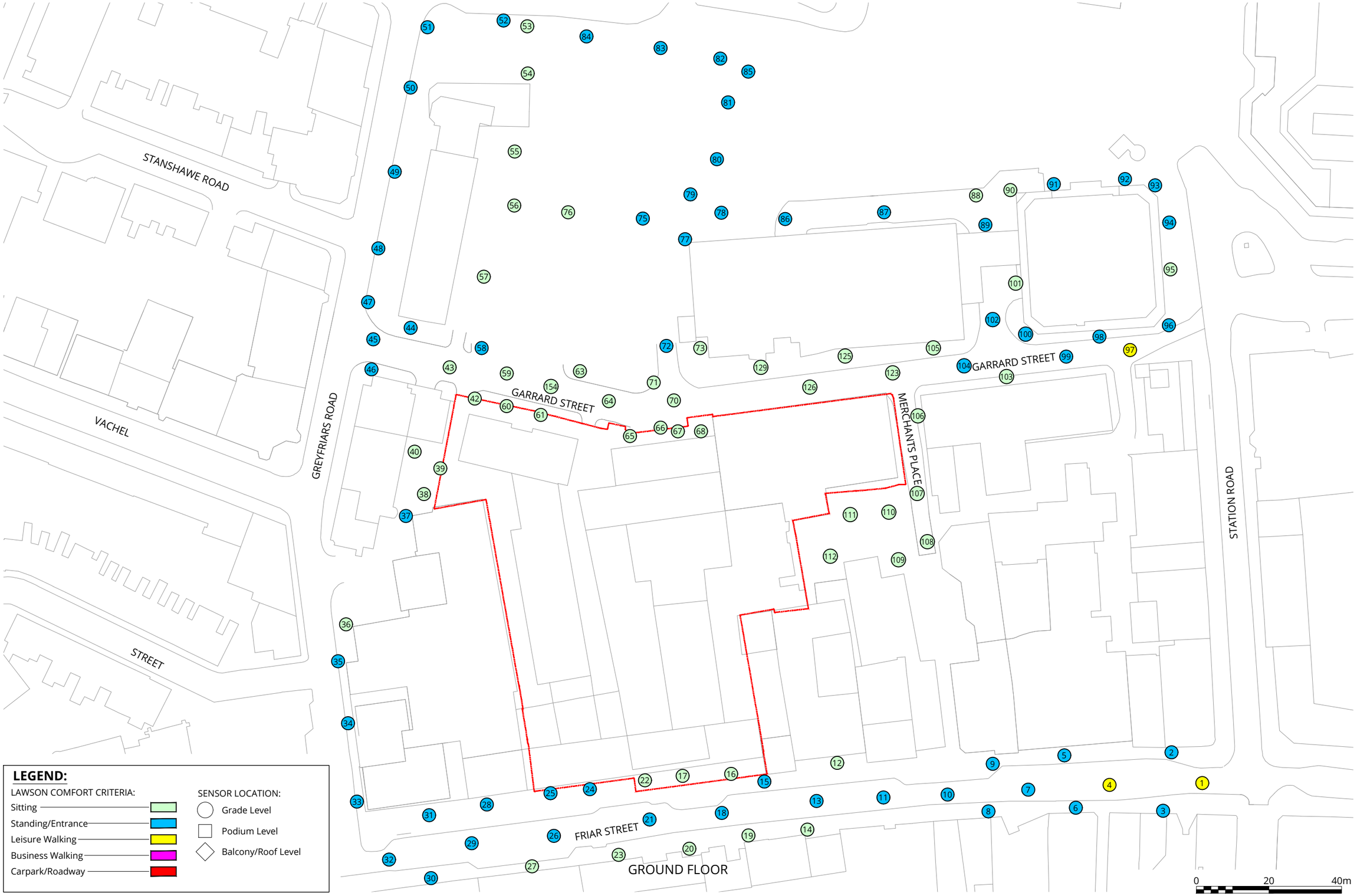
Location	Threshold Exceedance	Wind Direction (deg)	Hours per Annum
Configuration 1: Existing Baseline comprising the existing Site incorporating the Temporary Events Space with existing surrounding buildings			
There were no strong winds exceeding 15m/s for more than 2.2 hours in this configuration.			
Configuration 2: Proposed Development without Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place			
51	S15	10	**5.3**
54	S15	0	**10.9**
80	S15	180	**3.4**
81	S15	0	**3.5**
89	S15	0	**2.8**
Configuration 3: Proposed Development with Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place and wind mitigation measures			
51	S15	260	**4.3**
54	S15	0	**9.4**
80	S15	170	**2.7**
81	S15	0	**2.7**
89	S15	350	**2.3**
Configuration 4: Cumulative Scenario comprising the Reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters but with Plot B in accordance with the reserved matters consent for that plot) plus Cumulative Surrounds			
There were no strong winds exceeding 15m/s for more than 2.2 hours in this configuration.			

6. CONCLUSIONS

1. Meteorological data for the Site indicate strong prevailing winds from the south-west quadrant throughout the year with secondary winds from the north-east direction which are more prevalent during the spring months.
2. All locations in and around the Existing Site (Configuration 1) have wind conditions generally suitable for the intended use.
3. With the introduction of the Proposed Development devoid of any landscaping, windier conditions arise across the Site. Wind conditions exceeding the pedestrian comfort criteria occur at thoroughfares and terrace amenity spaces in and around the Proposed Development. These occur across the northern site, at thoroughfare locations around Plots A and B (Locations 51, 54, 80 and 81) and on the roof terraces of Plot E (Locations 167, 168, 173 and 174).
4. Moreover, wind conditions exceeding the pedestrian safety criteria occur within the northern part of the Proposed Site (locations 51, 54, 55 and 80).
5. As such, areas where wind mitigation measures are required have been identified as existing and proposed thoroughfares within the northern part of the site and the roof terraces of Plot E.
6. Mitigation measures on the roof terraces of Plot E were developed through further wind tunnel testing. They comprise:
   - Porous screens, approximately 1.2m tall and 50% porous on the roof terraces; and
   - Shrubs, approximately 1.2m tall on the roof terraces.
7. Wind mitigation measures for the northern part of the Site will be developed with the detailed design of the northern Site, including Plot A.
8. With the mitigation measures in place (Configuration 3) wind conditions are improved on the roof terrace of Plot E. As such, it has been identified that in order to achieve wind conditions suitable for amenity space use on the terraces, landscaping in the form of porous screens or shrubs around the sitting areas would be required. Further landscaping now proposed on the roof terraces[2] are anticipated to alleviate the localised remaining windy conditions.
9. Conditions exceeding the pedestrian safety and comfort criteria persist across the northern site; wind mitigation measures would be required when the detailed design of the northern site comes forward.
10. With the introduction of cumulative surrounding building including the detailed design of Plot B and in the absence of wind mitigation measures, wind conditions across the Site are improved All locations become suitable in terms of pedestrian safety and conditions exceeding the pedestrian comfort criteria at ground level persist at a single location, to the east of Plot B (location 80). There are areas at terrace levels where the pedestrian comfort criteria are exceeded (Locations 167, 168 and 173). Wind mitigation measures would be required in the northern site and will be implemented when its detailed design comes forward.

[2] 6516_SHR_D&A Landscape_DRAFT_02_190121.pdf received on 21/01/2019

FIGURES



Pedestrian Wind Comfort Conditions - Ground Floor

Configuration 1: Existing Baseline comprising the Existing Site Incorporating the Temporary Events Space with Existing Surrounding Buildings

Windiest Season

Station Hill, Reading

True North

Project #1803688

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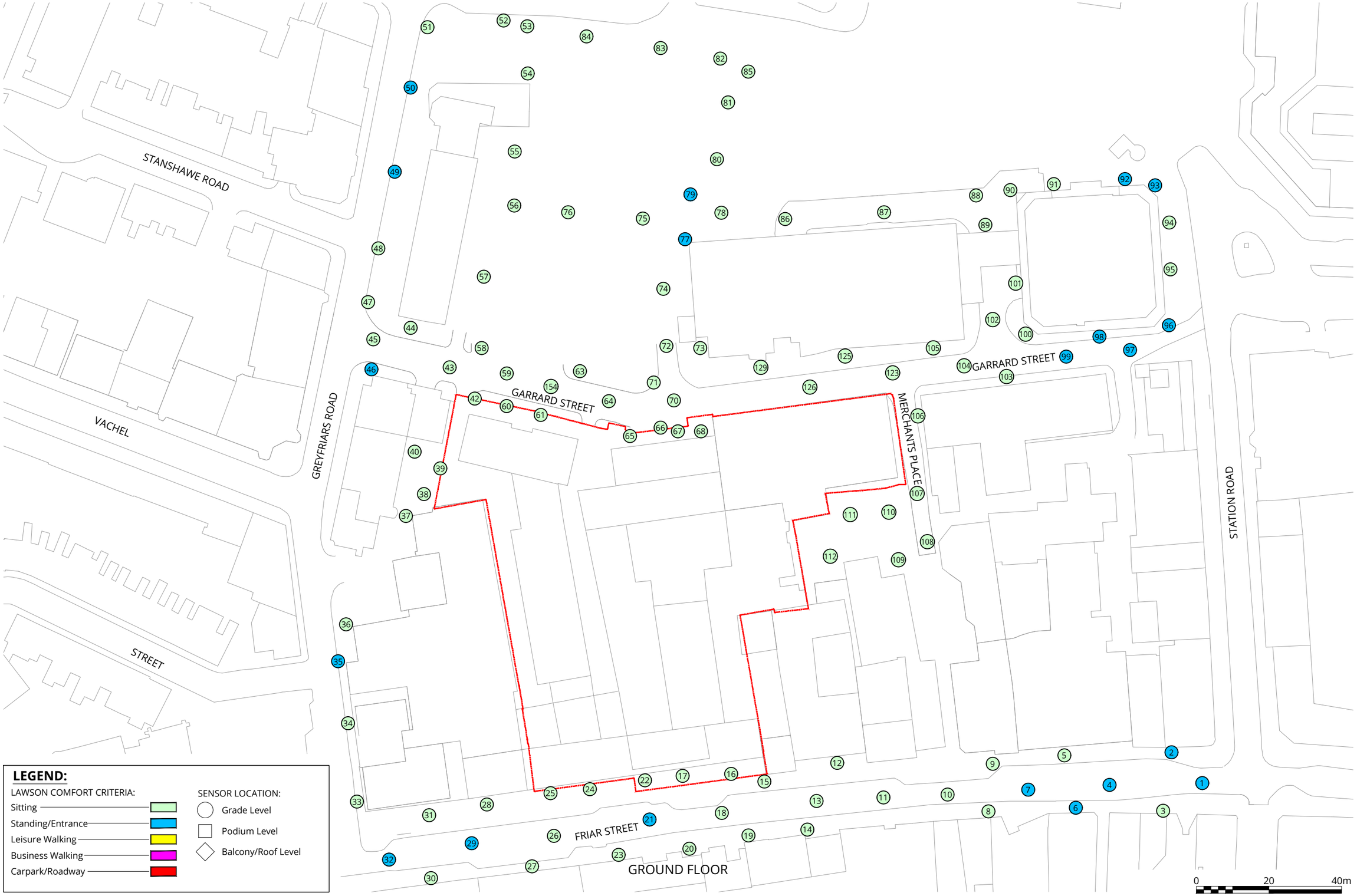
Date Revised:	Jan. 29, 2019	



Pedestrian Wind Comfort Conditions - Ground Floor
Configuration 1: Existing Baseline comprising the Existing Site Incorporating the Temporary Events Space with Existing Surrounding Buildings
Summer Season

Station Hill, Reading

True North

Project #1803688

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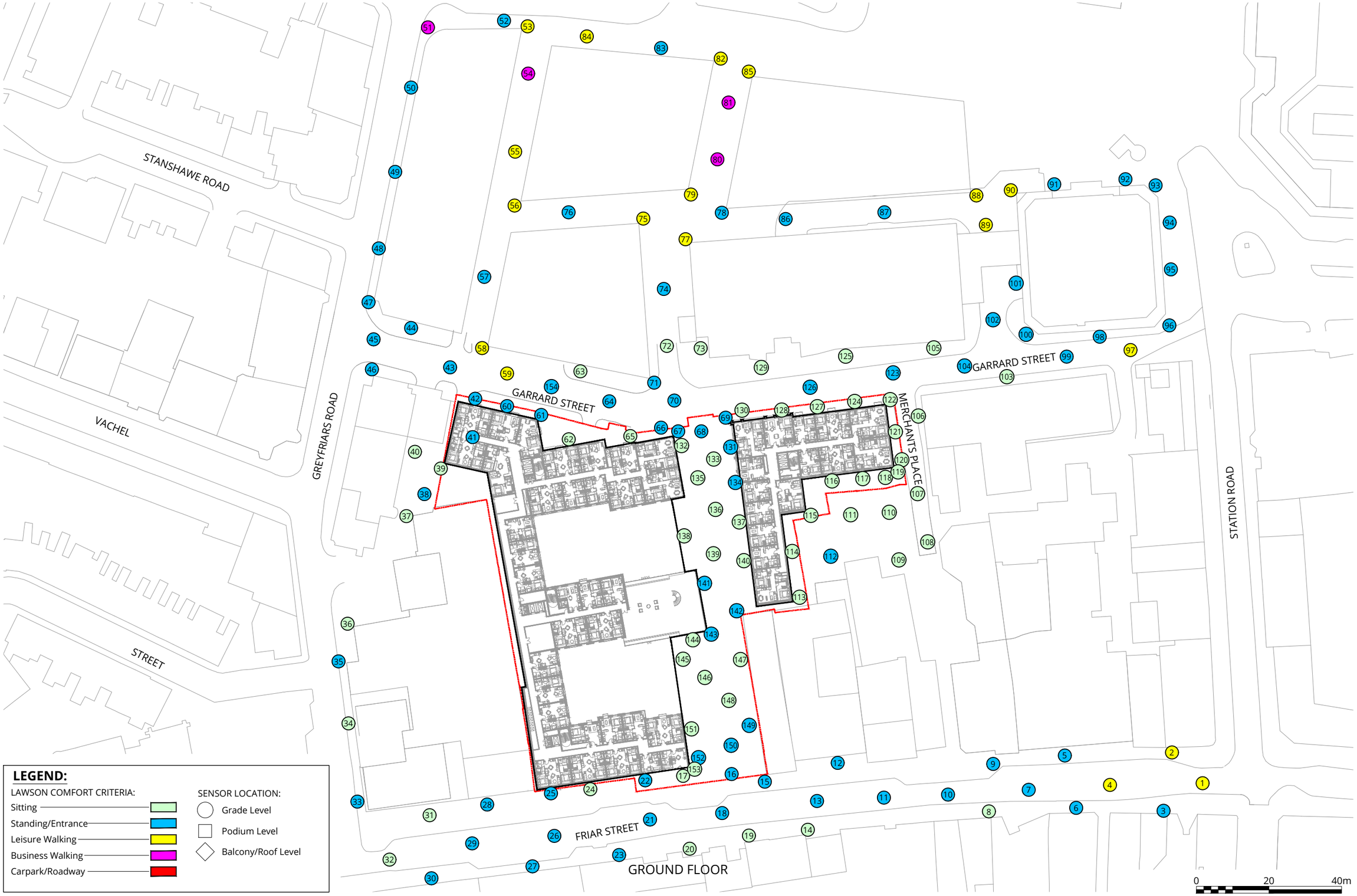

Pedestrian Wind Comfort Conditions - Ground Floor

Configuration 2: Proposed Development comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place

Windiest Season

Station Hill, Reading

True North

Project #1803688

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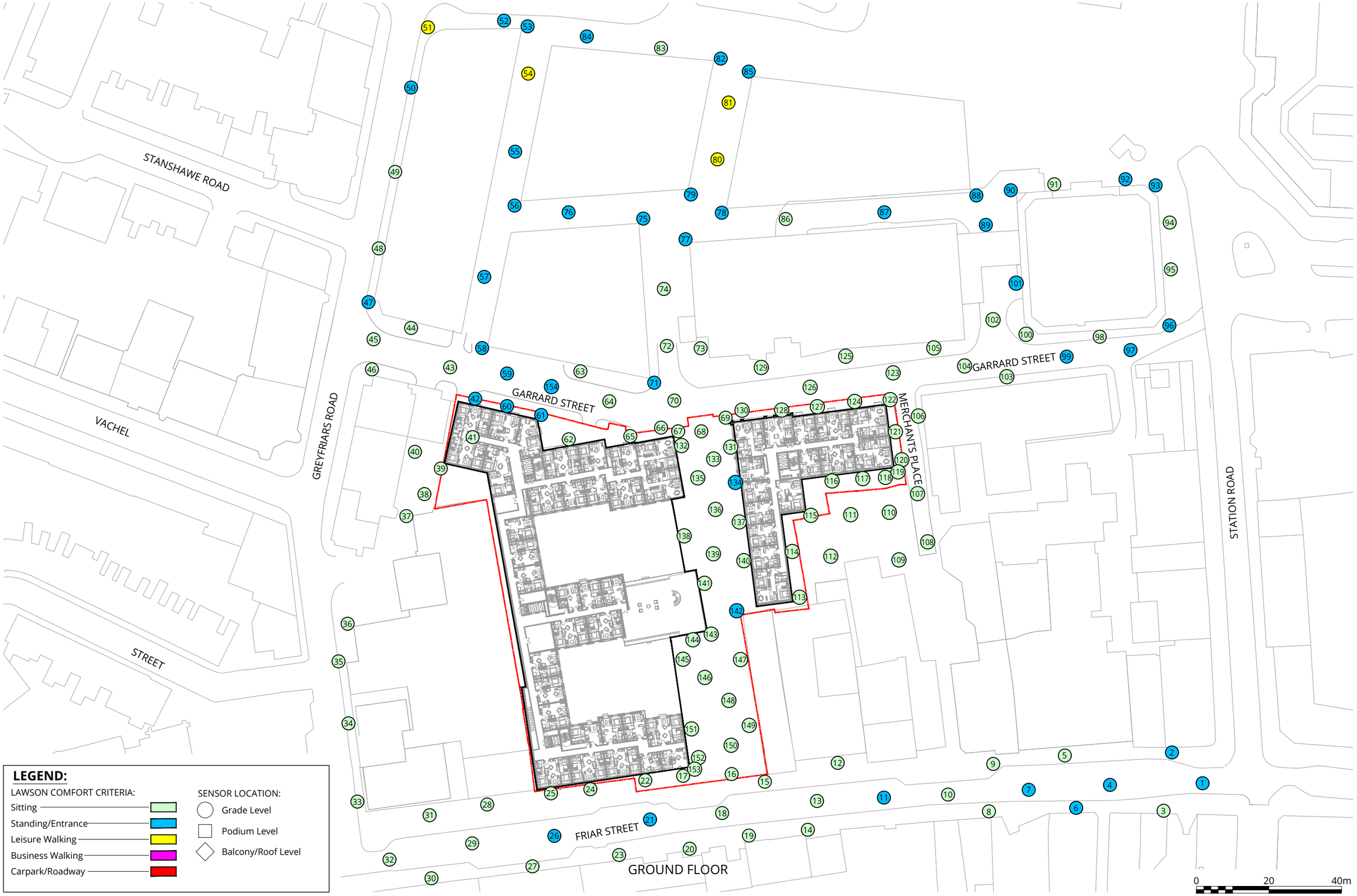

Pedestrian Wind Comfort Conditions - Ground Floor

Configuration 2: Proposed Development comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place

Summer Season

Station Hill, Reading

True North

Project #1803688

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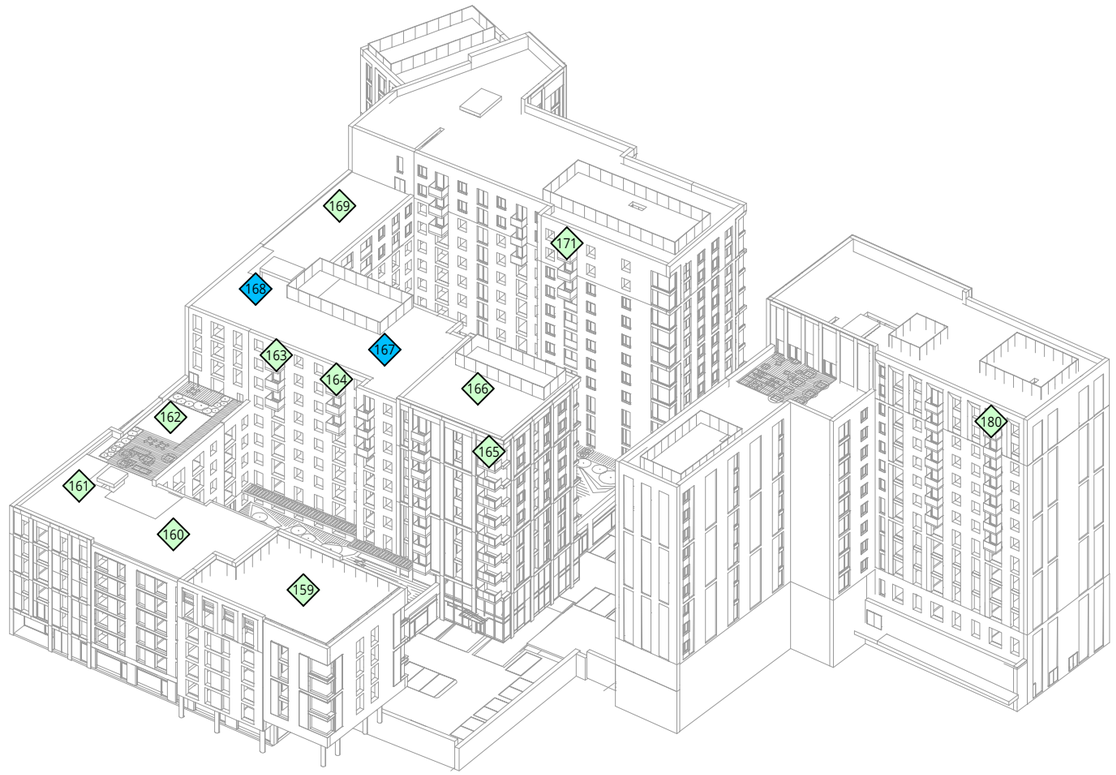
Date Revised:	Jan. 29, 2019	

NORTH / EAST



SOUTH / EAST

LEGEND:

LAWSON COMFORT CRITERIA:

- Sitting
- Standing/Entrance
- Leisure Walking
- Business Walking
- Carpark/Roadway

SENSOR LOCATION:

- Grade Level
- Podium Level
- Balcony/Roof Level

0 10 30m

Pedestrian Wind Comfort Conditions - Balconies, Podium and Roof View

Configuration 2: Proposed Development comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place mitigation measures.

Summer Season

Station Hill, Reading

Project #1803688

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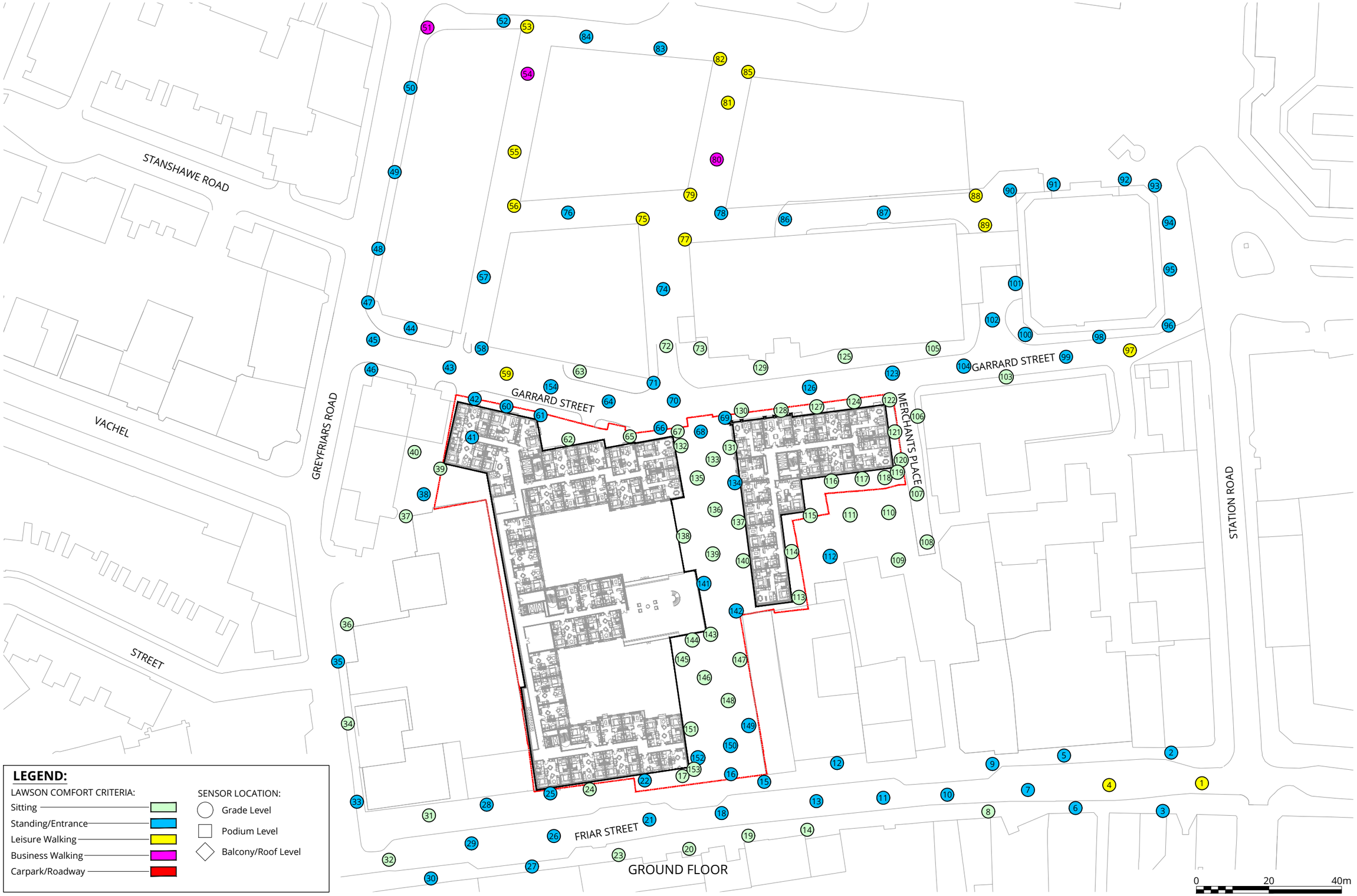

Pedestrian Wind Comfort Conditions - Ground Floor

Configuration 3: Proposed Development comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place and wind mitigation measures.

Windiest Season

Station Hill, Reading

True North

Project #1803688

Drawn by:	JLF	Figure:	8
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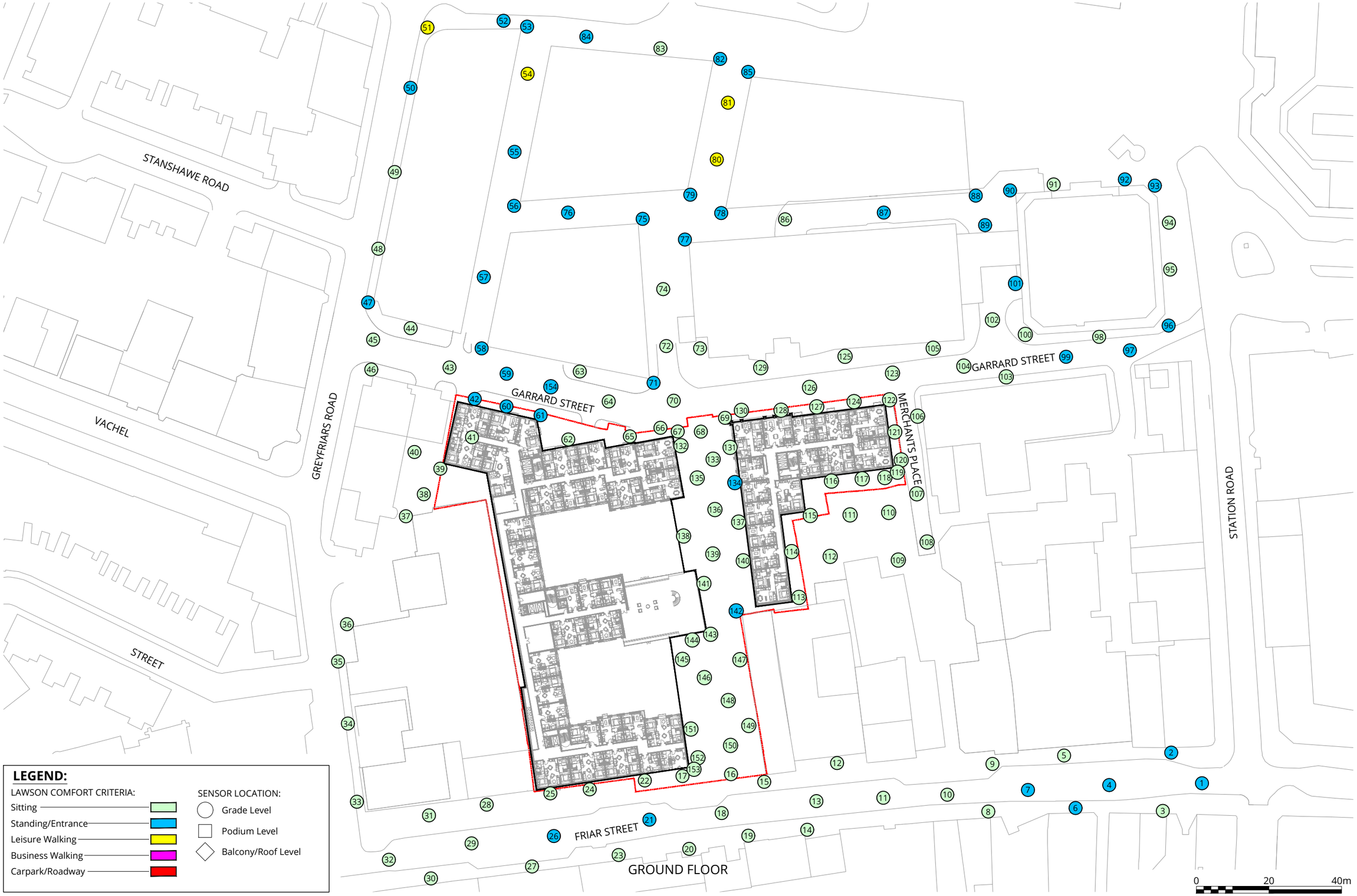
Date Revised:	Jan. 29, 2019		



Pedestrian Wind Comfort Conditions - Ground Floor

Configuration 3: Proposed Development comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place and wind mitigation measures.

Summer Season

Station Hill, Reading

True North

Project #1803688

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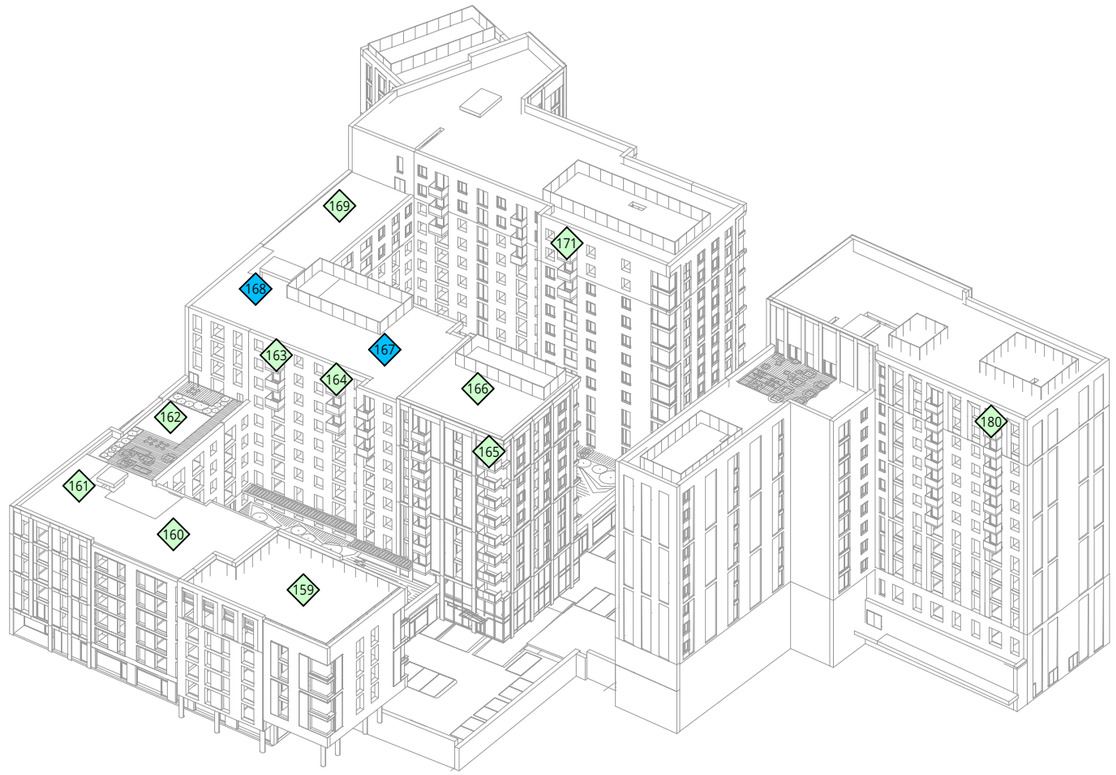
Date Revised:	Jan. 29, 2019	

NORTH / EAST



SOUTH / EAST

LEGEND:

LAWSON COMFORT CRITERIA:

- Sitting
- Standing/Entrance
- Leisure Walking
- Business Walking
- Carpark/Roadway

SENSOR LOCATION:

- Grade Level
- Podium Level
- Balcony/Roof Level

0 10 30m

Pedestrian Wind Comfort Conditions - Balconies, Podium and Roof View

Configuration 3: Proposed Development comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place and wind mitigation measures.

Summer Season

Station Hill, Reading

Project #1803688

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Approx. Scale @A3:	1:800
Date Revised:	Jan. 29, 2019

Pedestrian Wind Comfort Conditions - Ground Floor

Configuration 4: Cumulative Scenario comprising the Reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters but with Plot B in accordance with the reserved matters consent for that plot) plus Cumulative Surrounds

Windiest Season

Station Hill, Reading

True North

Project #1803688

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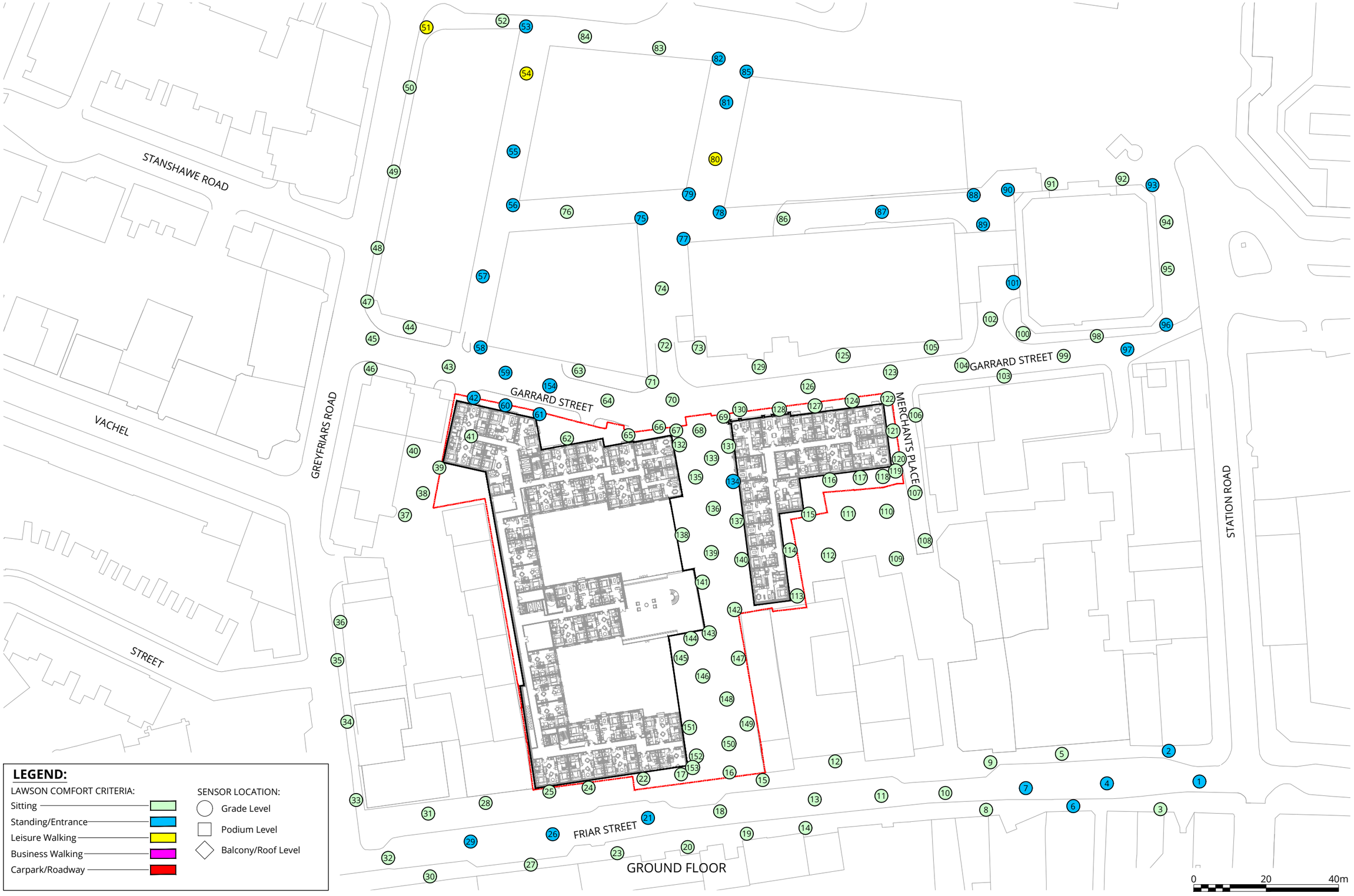


Pedestrian Wind Comfort Conditions - Ground Floor

Configuration 4: Cumulative Scenario comprising the Reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters but with Plot B in accordance with the reserved matters consent for that plot) plus Cumulative Surrounds

Summer Season

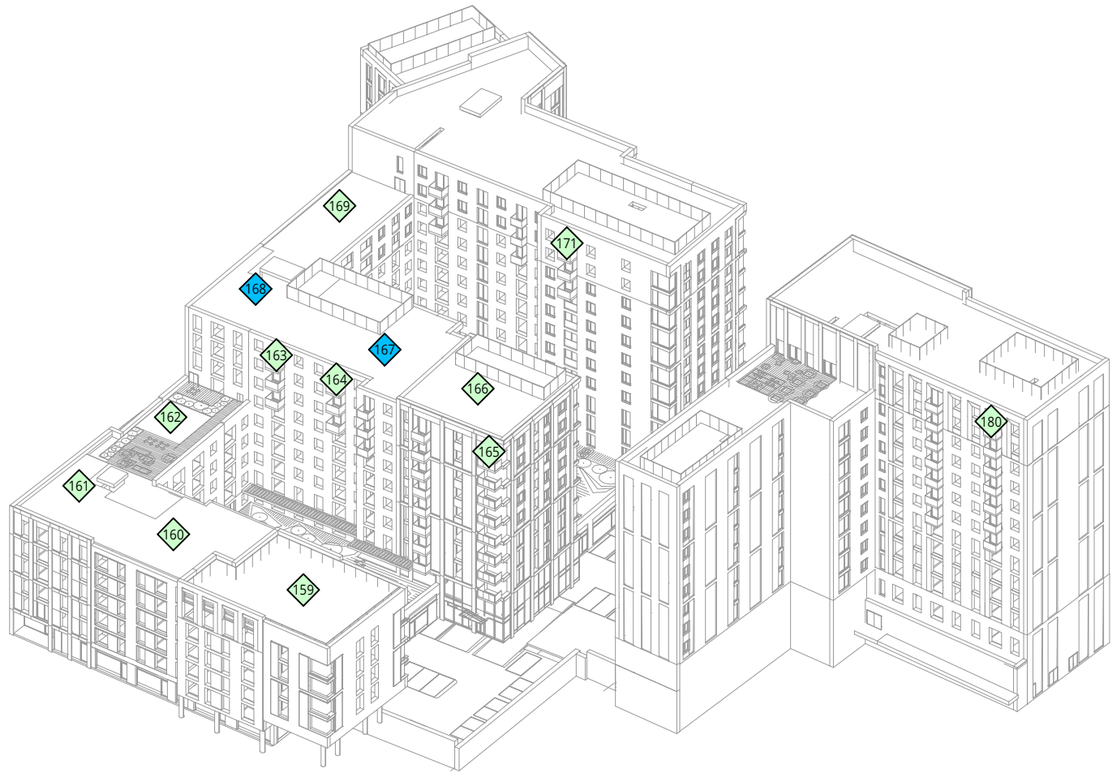
Station Hill, Reading

True North

Project #1803688

Drawn by:	JLF	Figure:	12
Approx. Scale @A3:	1:1000		
Date Revised:	Jan. 29, 2019		

NORTH / EAST



SOUTH / EAST

LEGEND:

LAWSON COMFORT CRITERIA:

- Sitting
- Standing/Entrance
- Leisure Walking
- Business Walking
- Carpark/Roadway

SENSOR LOCATION:

- Grade Level
- Podium Level
- Balcony/Roof Level

0 10 30m

Pedestrian Wind Comfort Conditions - Balconies, Podium and Roof View

Configuration 4: Cumulative Scenario comprising the Reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters but with Plot B mitigation measures.

Summer Season

Station Hill, Reading

Project #1803688

Drawn by:	JLF	Figure:	13
Approx. Scale @A3:	1:800		
Date Revised:	Jan. 29, 2019		

APPENDICES

APPENDIX A: WIND TUNNEL PHOTOS

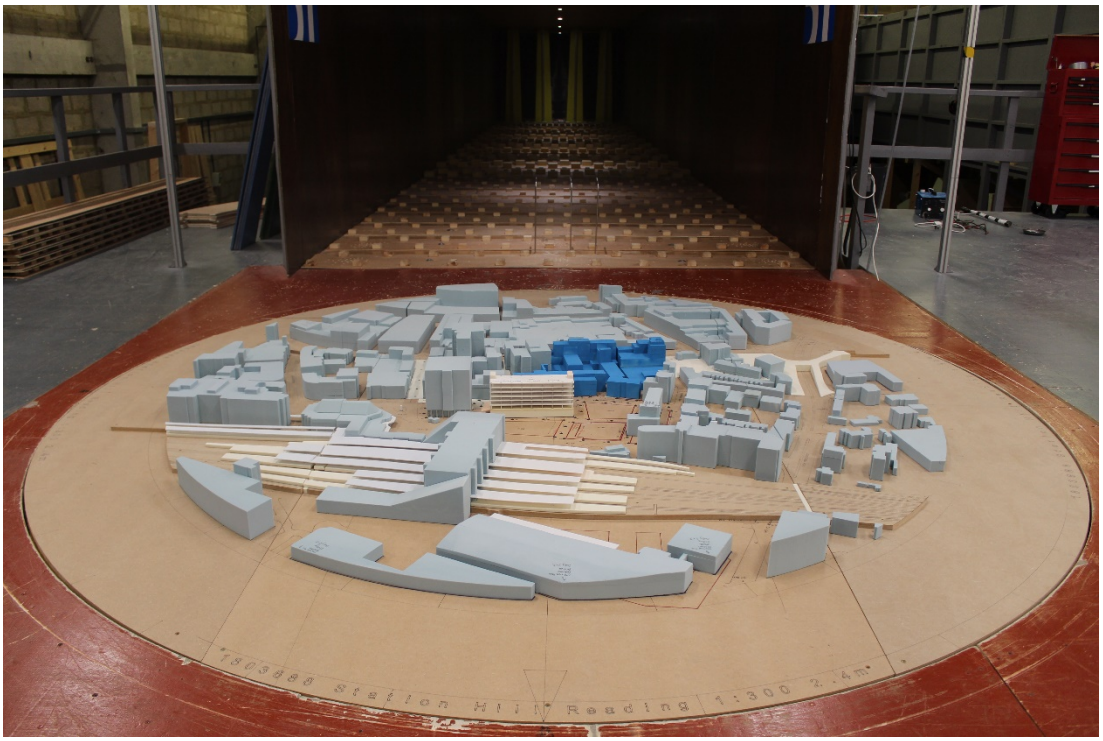


Figure 14: Existing Baseline comprising the existing Site incorporating the Temporary Events Space with existing surrounding buildings (Configuration 1) – View in the Wind Tunnel (from the north)

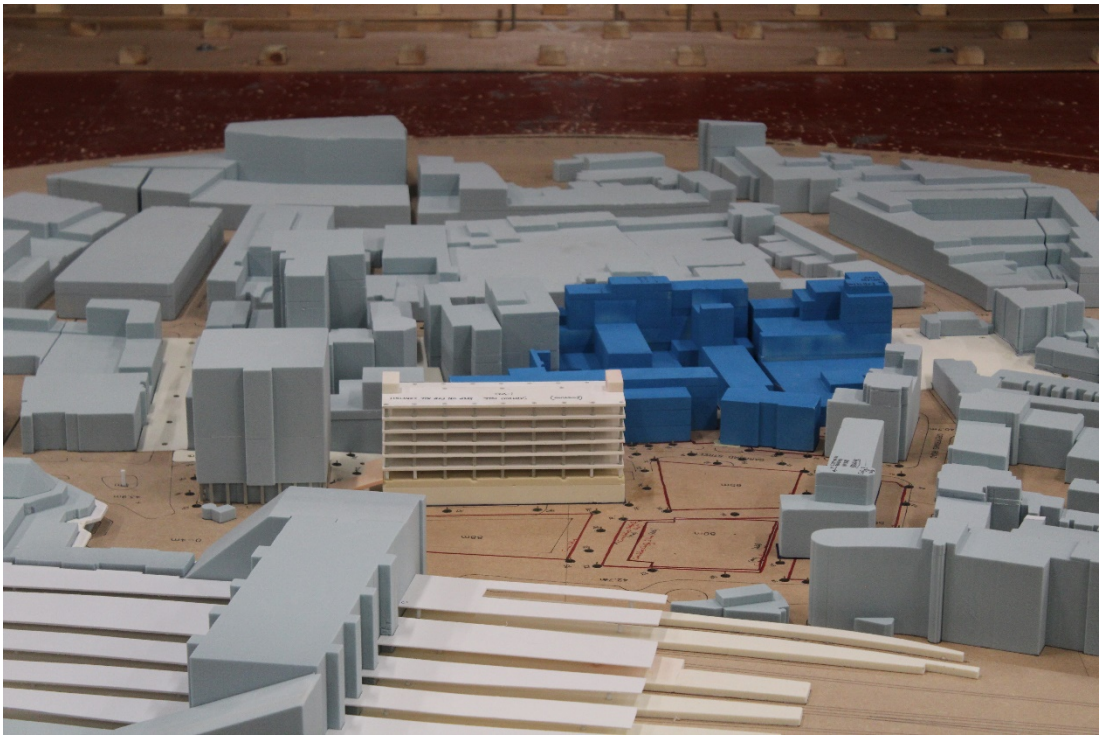


Figure 15: Existing Baseline comprising the existing Site incorporating the Temporary Events Space with existing surrounding buildings (Configuration 1) – View in the Wind Tunnel (from the south)

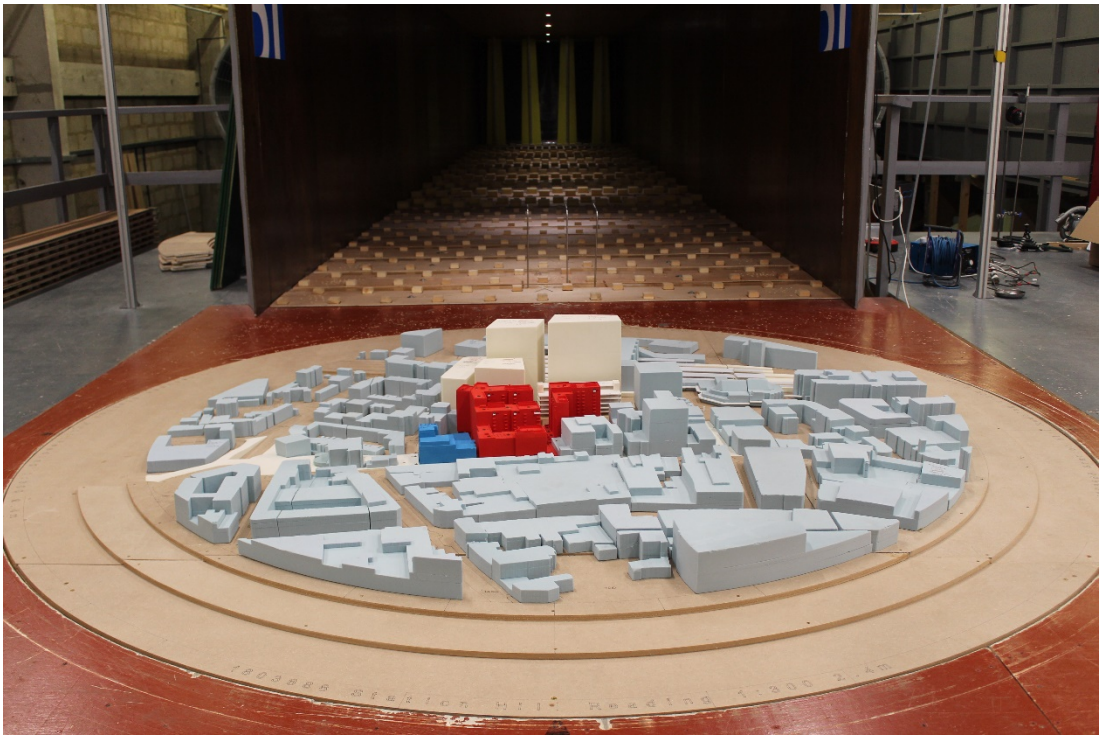


Figure 16: Proposed Development without Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place (Configuration 2) – View in the Wind Tunnel (from the south)

Figure 17: Proposed Development without Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place (Configuration 2) – View in the Wind Tunnel (from the south)

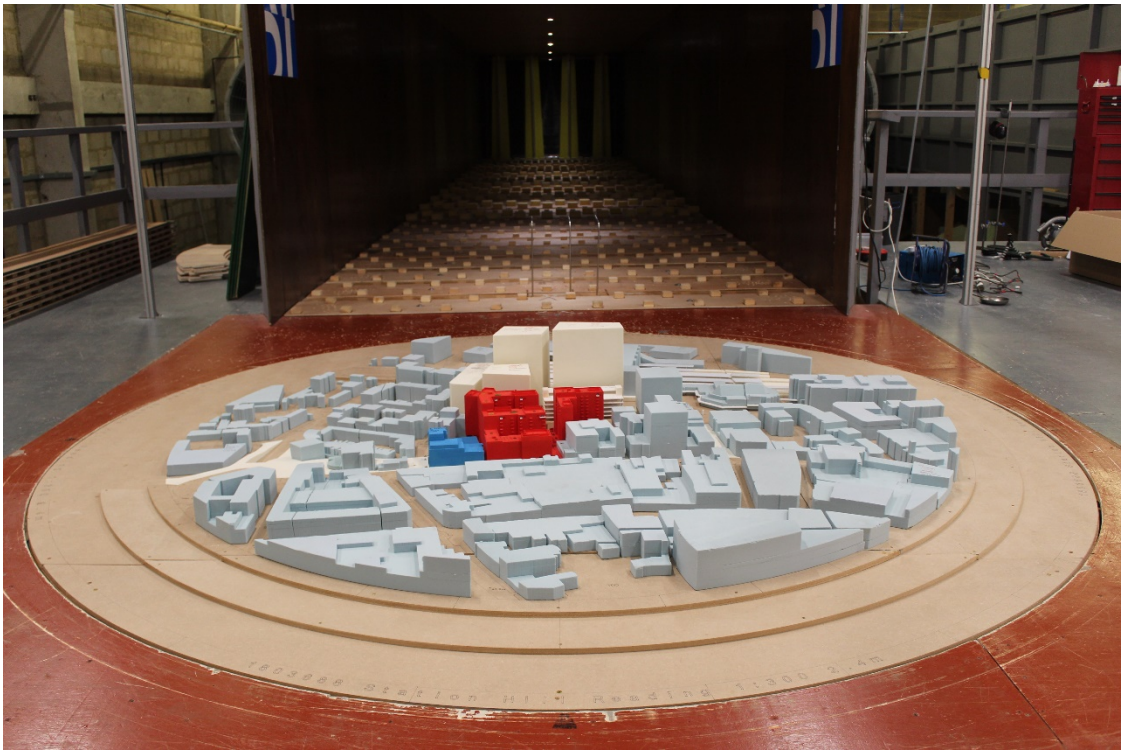


Figure 18: Proposed Development with Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place and wind mitigation measures (Configuration 3) – View in the Wind Tunnel (from the south)

Figure 19: Proposed Development with Mitigation comprising reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters) in place and wind mitigation measures (Configuration 3) – View in the Wind Tunnel (from the south)

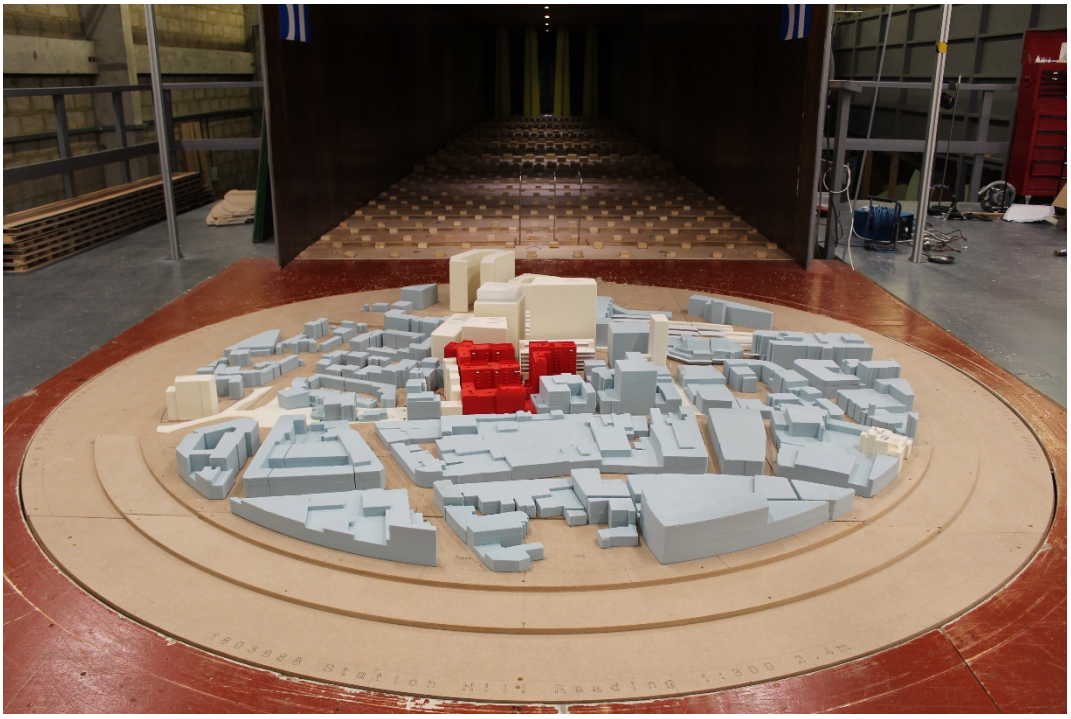


Figure 20: Cumulative Scenario comprising the Reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters but with Plot B in accordance with the reserved matters consent for that plot) plus Cumulative Surrounds (Configuration 4) – View in the Wind Tunnel (from the south)

Figure 21: Cumulative Scenario comprising the Reserved matters details for Plots E and F with the remaining Station Hill Development (as maximum parameters but with Plot B in accordance with the reserved matters consent for that plot) plus Cumulative Surrounds (Configuration 4) – View in the Wind Tunnel (from the south)

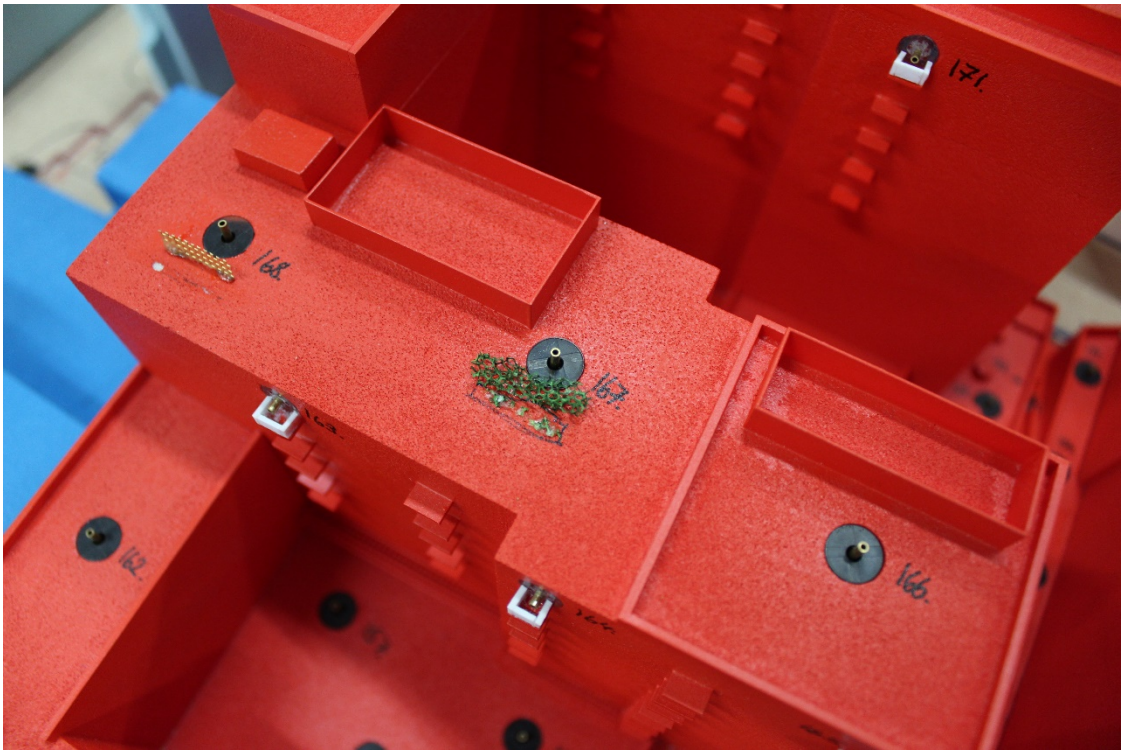


Figure 22: Mitigation measures

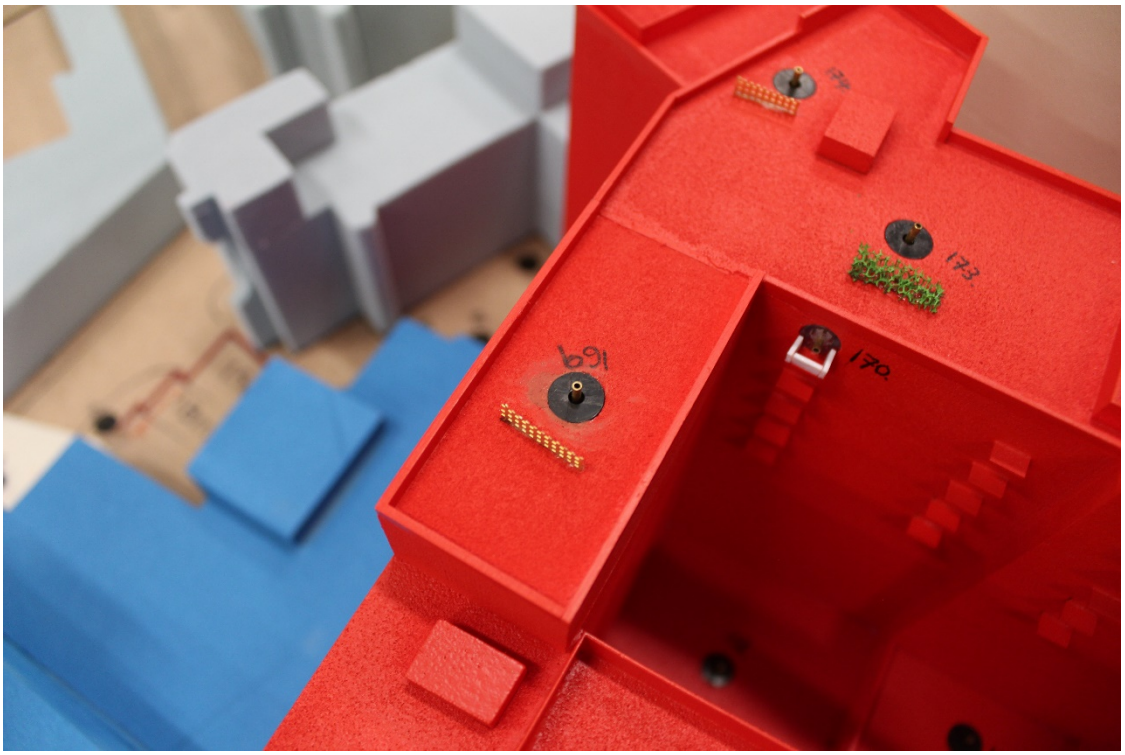


Figure 23: Mitigation measures

Figure 24: Mitigation measures

APPENDIX B: METEORLOGICAL DATA

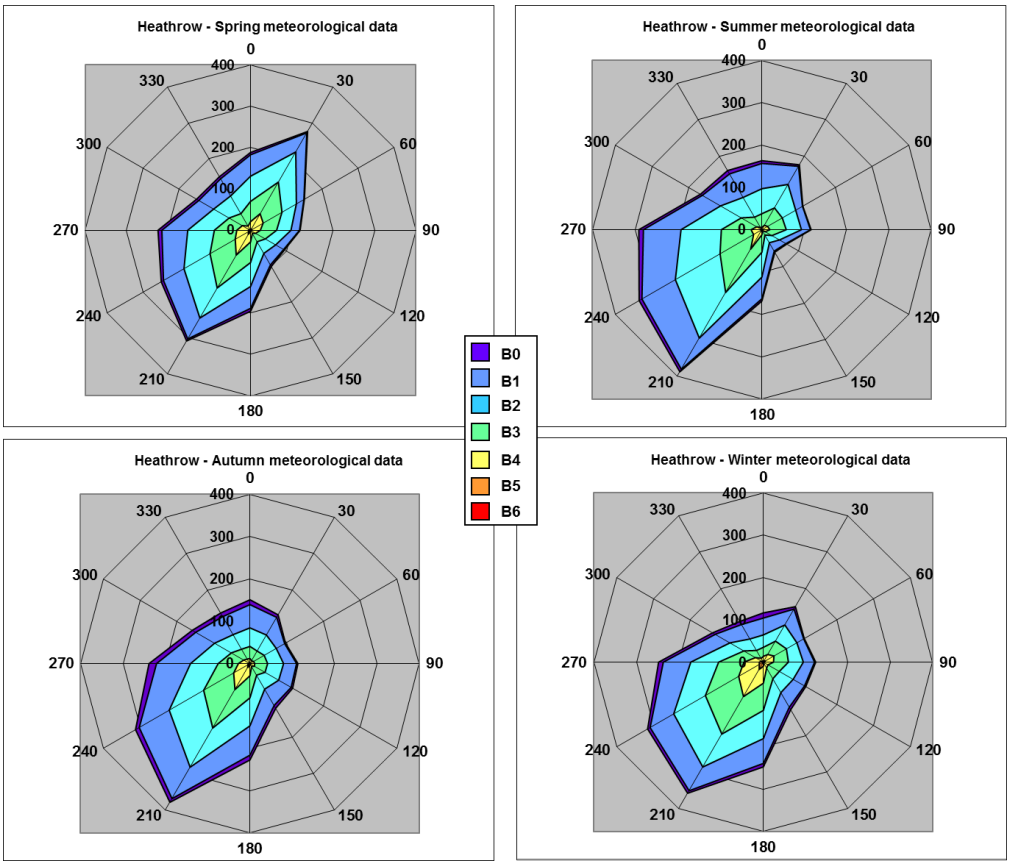


Figure 25: Seasonal wind roses for Reading (in Beaufort Force) - (Radial axis indicates the hours for which the stated Beaufort Range is exceeded)