Waterloo Estate (South)

Environmental Wind Tunnel Study

Stockland Developments Pty Limited

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Sydney NSW 2000

Prepared by:

SLR Consulting Australia

SLR Project No.: 610.032969.00001

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Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
R02-v1.2	30 March 2026	Dr Farzin Ghanadi	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy
R02-v1.2	12 February 2026	Dr Farzin Ghanadi	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy
	Click to enter a date.			

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Stockland Developments Pty Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client and the Department of Planning, Housing and Infrastructure (the Department). No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

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1.0 INTRODUCTION

This quantitative wind assessment report is submitted to the Department of Planning, Housing and Infrastructure (the Department) on behalf of Stockland and Homes NSW (previously known as the Land and Housing Corporation) (the Applicant), and accompanies the State Assessed Rezoning Proposal and Concept State Significant Development Application (SSDA) for the redevelopment of the site within the Waterloo Estate (South), hereafter referred to as 'Waterloo South'.

In this report reference to "Homes NSW" or "the Applicant" shall also be taken to mean "New South Wales Land and Housing Corporation (LAHC)" who is the registered owner of 93 per cent of land within the Waterloo South Precinct Area. Any reference to "Waterloo South" in this report should be read as the redevelopment of land owned by LAHC and associated public land (such as roads) throughout the Precinct Area.

The concept development is categorised as State Significant Development (SSD) as per Section 26, Schedule 1 of *State Environmental Planning Policy Planning Systems 2021* (Planning Systems SEPP) as the project includes housing development carried out by or on behalf of the LAHC, with an estimated development cost (EDC) of more than $30 million.

The concept, in summary, aims to deliver:

- High quality mixed tenure housing in the context of a rapidly transforming area.
- Approximately 3,300 new dwellings, of which a minimum 30% will be social housing, approximately 20% will be affordable housing, and a maximum 50% will be market housing (measured as a percentage of the total residential gross floor area).
- Publicly accessible open space and public realm activation.
- An authentic mixed-use precinct, with housing co-located with non-residential uses, community facilities, essential services, and access to public transport.

The concept SSDA will guide the detailed design of future buildings, open spaces, and the public realm within the Waterloo South site. The concept SSDA seeks development consent for key planning metrics, including maximum building envelopes, building heights, setbacks, vehicular access points and road network, and the distribution of floor area across different land uses and residential tenure types.

A state-assessed rezoning application has also been prepared and submitted concurrently to give effect to this concept SSDA. The state-assessed rezoning application seeks amendments to the *Sydney Local Environmental Plan 2012* (SLEP 2012) and the Waterloo Estate (South): Design Guide 2022 (2022 Design Guide) to align with the maximum building envelopes sought in this concept SSDA. Notably no additional gross floor area (GFA) or density is sought under the state-assessed rezoning application than is currently permissible on the site under the SLEP 2012.

2.0 Relevant SEARs

This quantitative wind assessment addresses the following relevant Secretary's Environmental Assessment Requirements (SEARs) set out in the table below.

Table 1 SEARs Compliance Table

SEARS Request	Response / Location in Report
1. Environmental Amenity Assess amenity impacts on the surrounding locality, including solar access, visual privacy, view loss and view sharing, as well as wind, lighting and reflectivity impacts. A high level of environmental amenity for any surrounding residential or other sensitive land uses must be demonstrated.	**Section 9**
22. Public Spaces Demonstrate how the development: maximises the amenity of public spaces in line with their intended use, such as through adequate facilities, solar access, shade and wind protection.	**Section 9**

3.0 The Site

The Waterloo South Precinct Area comprises approximately 123,149m^2 across 10 street blocks in the City of Sydney Local Government Area (LGA), generally bounded by Cope, Raglan, George, Wellington, Gibson, Kellick, Pitt and McEvoy Streets. The Waterloo South site area, excluding any privately owned properties within the Waterloo South Precinct Area, comprises approximately 114,822m^2, or just over 93 per cent of the land within the Precinct Area. The legal description of Waterloo South Precinct Area is detailed in **Table 2**.

Table 2 Legal Description of Waterloo South

Address	Lot/DP
Lots owned by NSW Land and Housing Corporation (land is subject to both the rezoning and the concept SSDA)	
209-219 Cope Street, Waterloo	Lot 1 DP 217386
238-246 George Street, Waterloo	Lot 1 DP 225159
229-231 Cope Street Waterloo	Lot 3 DP 10721
6 John Street, Waterloo	Lot 1 DP 533762
97-109 Cooper Street, Waterloo	Lot A DP 105916, Lot B DP 105916, Lot C DP 105916, Lot 14 DP 10721,
248-254 George Street, Waterloo	Lot 2 DP 533678
232 Pitt Street, Waterloo	Lot 11 DP 635663, Lot 10 DP 635663
74-76 Wellington Street, Waterloo	Lot 1 DP 224728
331-337 George Street, Waterloo	Lot 3 DP 533680

Address	Lot/DP
247-251 Cope Street, Waterloo	Lot 1 DP 533679
339-341 George Street, Waterloo	Lot 1 DP 77168
250 Pitt Street, Waterloo	Lot 313 DP 606576
Cooper Street, Waterloo	Lot 3 DP 217386
Lots owned by others (land that does not form a part of the concept SSDA)	
221-223 Cope Street, Waterloo	Lot 6 DP 10721, Lot 7 DP 10721, Lot 9 DP 10721, Lot 8 DP 1147179
225-227 Cope Street, Waterloo	Lot 5 DP 10721, Lot 4 DP 10721
233 Cope Street, Waterloo	Lot 12 DP 1099410, Lots 1-41 SP 79210
116 Wellington Street, Waterloo	Lot 10 DP 10721, Lot 11 DP 10721
111 Cooper Street, Waterloo	Lot 15 DP 10721
291 George Street, Waterloo	Lot 10 DP 1238631, Lots 1-20 SP 96906
110 Wellington Street, Waterloo	Lot 101 DP 1044801, Lots 1-58 SP 69476
336 George Street, Waterloo	Lot 3 DP 10686
213-215 Cope Street, Waterloo	Lot 2 DP 217386

3.1 Site and Surrounding Context

The suburb of Waterloo is located with the City of Sydney Local Government Area (LGA) and is located 3km south of Sydney CBD. The site is part of the broader “Waterloo Estate”, which comprises the northern, central, and southern precincts and accommodates a significant community residing in social housing.

The Waterloo South precinct is predominantly owned by NSW Land and Housing Corporation (LAHC), however, as outlined in **Table 2,** the site, the subject of this report, excludes several privately owned lots located within the boundary of the broader Waterloo South precinct outlined in **Figure 1**. The privately owned lots are currently used for residential, office, light industrial, and infrastructure uses. The LAHC owned sites are currently used almost exclusively for the provision of social housing, with ancillary offices and community facilities. Overall, Waterloo South currently contains a total of 750 social housing dwellings and 120 private dwellings.

As shown in **Figure 2**, surrounding suburbs include Redfern to the north, Green Square to the south, Alexandria to the west and Zetland to the east. This broader area has been subject to significant change over the last 10 years with projects such as South Eveleigh, Redfern North Eveleigh Precinct Renewal, Waterloo Metro Quarter and over station development (OSD) all contributing to the changing character of the area.

These broader renewal projects are supported by proximity to a range of public transport services, including Redfern Station, Green Square Station, and Waterloo Metro Station, all of which are within walking distance of Waterloo South.

Figure 1 Aerial view of the Waterloo Estate and the Waterloo Estate (South) precinct

Source: Six Maps, modified by Beam Planning

Figure 2 Waterloo Estate (South) Project Area

Source: SJB

4.0 Project Vision and Intended Outcomes

The vision for the site is to create a unique and vibrant mixed-tenure housing precinct that supports the needs of the community and delivers much needed housing in response to National and State Government priorities.

The Vision is:

To create a new and unique urban village on the Project Land (Gadigal Land) which: delivers new homes, community places and green spaces with diverse housing choice and amenity; prioritises the health and wellbeing of residents; and offers an authentic sense of place and mixed and more sustainable local and mixed communities.

The proposed redevelopment seeks to respond to this Vision by creating a unique and vibrant neighbourhood that can deliver significant social benefits to residents, visitors, and workers in the Waterloo area and broader City of Sydney LGA. The co-location of community uses with housing and employment will ensure the redevelopment is an integrated, accessible and connected precinct that supports the social needs of community.

5.0 Proposed Concept SSDA

The concept SSDA seeks concept approval in accordance with section 4.22 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the comprehensive redevelopment of the Waterloo South precinct.

The concept development proposal, if approved, will guide the detailed design of future buildings, public open spaces, and the public realm within the Waterloo South precinct. It will seek concept development consent for key planning metrics for the precinct as generally described in **Table 3.**

Table 3 Key development metrics

Descriptor	Project Details
Project Area	• Waterloo South has a developable site area of 114,822sqm / 11.5ha • The broader Waterloo South Precinct Area, which includs all LAHC owned and privately owned properties and roads within the precinct, has a site area of 123,149sqm / 12.3ha
Project Description	• Maximum building envelopes, including maximum building heights, street-wall heights and ground and upper-level setbacks • Distribution of gross floor area (GFA) across the Waterloo South precinct development blocks • Indicative allocation of floor space between social, affordable and market housing, as well as non-residential and community uses across the Waterloo South Precinct Area. • Loading, vehicular and pedestrian access arrangements • Indicative subdivision plan, staging plan and delivery sequencing for development and the provision of public space, local infrastructure, flood and stormwater management works and remediation works • Approval of the following management plans and strategies to inform future stages of the development: - Updated Design Excellence Strategy - Design with Country Strategy - Preliminary Public Art Strategy - Contamination Strategy - Flood Management Strategy - Stormwater Management and Drainage Strategy

	- ESD Strategy - Strategies for utilities and service provision including service infrastructure lead-in enabling works - Tree Retention Strategy - Apartment Design Guide precinct strategy
Land Uses	**Residential** • Social housing: no less than 30% of residential GFA • Affordable housing: ~20% of residential GFA (balance between the delivery of minimum 30% social housing and the maximum 50% market housing) • Market housing: no greater than 50% of residential GFA **Non-residential** • A total of 15,000m^2 of GFA, of which at least 5,000m2 of GFA is to be delivered as 'Community Uses' (which can include childcare, health, education or community facilities).
Gross Floor Area	Up to 282,485m^2
Building Heights	Between 2 and 33 storeys
Car Parking	Approximately 1,500 spaces (across all land uses), excluding on-street car parking spaces
Staging/ Phasing	It is expected that the redevelopment will occur in seven (7) stages (inclusive of the delivery of the large park on Block 1), however this staging remains indicative.

6.0 SYDNEY'S WIND CLIMATE

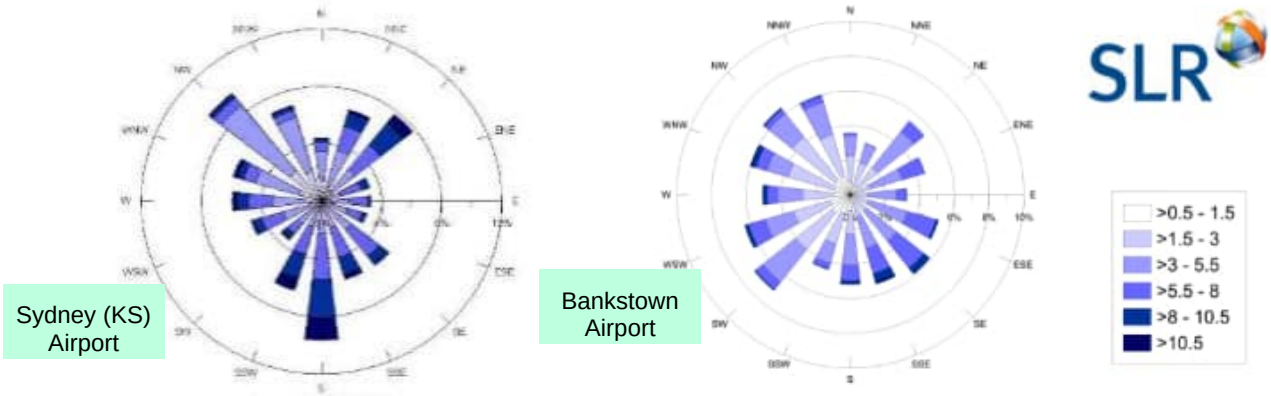
The data of interest in this study are the mean hourly wind speeds and largest gusts experienced throughout the year (especially higher, less frequent winds), how these winds vary with azimuth, and the seasonal break up of winds into the primary Sydney Region wind seasons.

6.1 Annual and Seasonal Variations

Key characteristics of Sydney's Regional Wind Climate are illustrated in two representative wind roses shown in **Figure 3** taken from Bureau of Meteorology (BoM) data recorded during the period 1999-2017 at Sydney (Kingsford Smith) Airport and Bankstown Airport. A review of the associated seasonal wind roses (refer to **Appendix A**) shows that Sydney is affected by two primary wind seasons with relatively short (1-2 month) transition periods in between:

- Summer winds occur mainly from the northeast, southeast, and south. While northeast winds are the more common prevailing wind direction (occurring typically as offshore land-sea breezes), southeast and southerly winds generally provide the strongest gusts during summer. Both northeast winds (as sea breezes) and stronger southerly winds associated with "Southerly Busters" and "East Coast Lows" typically have a significantly greater impact along the coastline. Inland, these systems lose strength and have altered wind direction characteristics.
- Winter/Early Spring winds occur mainly from west quadrants and to a lesser extent from the south. West quadrant winds provide the strongest winds during winter and in fact for the whole year, particularly at locations away from the coast.

Figure 3 Annual Wind Roses for Sydney (KS) Airport and Bankstown Airport (BoM Data)



6.2 Wind Exposure at the Site – the "Local"' Wind Environment

Close to the ground, the "regional" wind patterns described above are affected by the local terrain, topography and built environment, all of which influence the "local" wind environment.

- The site is currently surrounded by a mix of low- to mid-rise residential dwellings and commercial buildings to most directions, together with streetscapes characterised by established vegetation and mature trees. A limited number of existing high-rise buildings are located to the north of the site, while additional high-rise developments are proposed to the west.

- The site will therefore receive limited to moderate shielding depending upon oncoming wind direction at lower levels with upper levels exposed to higher winds from a number of wind directions.

6.3 DESIGN WIND SPEEDS

SLR has carried out a detailed study of Sydney Basin wind speeds using continuous records of wind speed and direction measured at the Bureau of Meteorology's (BoM) Sydney weather stations. The above analysis is described in detail in …

- SLR Technical Note: "9300-TN-CW&E-v2.0 Sydney Region Design Winds", March 2018.

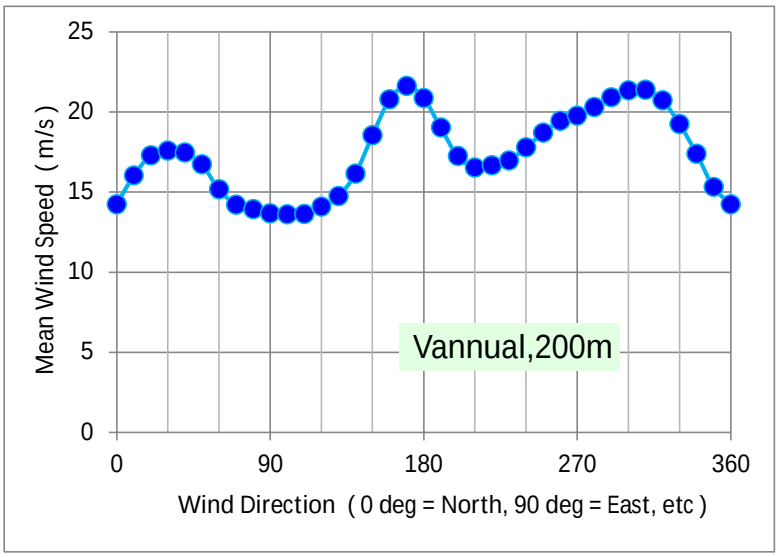
In particular, SLR has determined statistical wind information for locations not situated in close proximity (ie within say approximately a kilometre) of BoM weather stations. Particular emphasis was given to weather stations with a "clean" surrounding exposure, ie stations such as Sydney (Kingsford Smith) Airport and Bankstown Airport, which are relatively free of immediately surrounding obstacles such as buildings, vegetation, trees, etc, which would otherwise distort the winds seen by the weather station anemometer.

For the Project site, SLR has determined that local upper-level winds reflective of the weather systems experienced at the site would have characteristics closer to Sydney (KS) Airport compared to Bankstown Airport, given Site's distance inland from the coast compared to Sydney (KS) Airport and Bankstown Airport

6.4 Reference Height Annual Mean Wind Speeds

In the wind tunnel testing, the reference dynamic pressure used to record all wind speed data was measured at an equivalent (full-scale) height of 200 m above ground level (500 mm in the wind tunnel). Accordingly, conversion from wind tunnel speeds to full-scale speeds requires the determination of reference height design mean wind speeds for the site. These are shown in **Figure 4** and have been based on the adopted Sydney Airport wind model as described above. The winds shown have a once-per-year exceedance probability. The highest winds occur from the south and west to northwest quadrants with a secondary (more moderate) peak arising from summertime NE breezes.

Figure 4 Reference Height (200 m) Annual Recurrence Mean Wind Speed at Project Site



7.0 WIND ACCEPTABILITY CRITERIA

The selection of appropriate criteria for assessing the acceptability of ground-level wind conditions has been the subject of extensive international research over several decades. Early studies linked pedestrian wind impacts to the Beaufort Wind Speed Scale, which characterises the effects of varying wind intensities on human activity and comfort – refer **Table 4**. The effects summarised in this table represent wind conditions that occur with a frequency greater than 5% over the relevant averaging period.

Table 4 Beaufort Wind Speed – LAND Scale

Beaufort Force	Hourly Average Wind Speed (m/s)	Description of Wind	Noticeable Wind Effect
0	< 0.45	Calm	Smoke rises vertically
1	0.45 to 1.55	Light air	Direction shown by smoke drift but not by wind vanes
2	1.55 to 3.35	Light breeze	Wind felt on face; leaves rustle; wind vanes begin to move
3	3.35 to 5.0	Gentle breeze	Leaves, small twigs in constant motion; Light flags extended
4	5.6 to 8.25	Moderate breeze	Raises dust and loose paper; small branches move
5	8.25 to 10.95	Fresh breeze	Small trees, in leaf, sway
6	10.95 to 14.10	Strong breeze	Large branches begin to move; telephone wires whistle Umbrellas used with difficulty
7	14.1 to 17.2	Moderate Gale	Whole trees in motion Inconvenience felt when walking against the wind.
8	17.2 to 20.8	Gale	Twigs break off trees; personal progress impeded
9	20.8 to 24.35	Strong/Severe Gale	Slight structural damage (chimney pots, slates removed)
10	24.35 to 28.4	Storm	Trees uprooted; considerable structural damage
11	28.4 to 32.4	Violent Storm	Widespread damage – unusual event
12	> 32.4	Hurricane	Devastation – only occurs in the tropics

7.1 Comfort and Safety Criteria

This assessment evaluates wind conditions at key outdoor pedestrian and trafficable areas surrounding the proposed development by reference to the requirements of the Sydney

Development Control Plan 2012 (SDCP 2012). As part of this process, the existing wind environment along adjacent pedestrian footpaths has also been examined to establish baseline conditions. Where existing wind conditions are found to exceed the applicable criteria, the SDCP 2012 requires that the post-development wind environment achieves, at a minimum, parity with existing conditions.

Consistent with the SDCP 2012, the wind assessment considers conditions occurring during daytime and evening hours between 6:00 am and 10:00 pm (AEST). Wind performance at the identified critical locations is assessed against two distinct criteria sets: pedestrian safety and pedestrian comfort. Pedestrian safety is evaluated using annual maximum gust wind speeds, while pedestrian comfort is assessed using Gust Equivalent Mean (GEM) wind speeds. A summary of the adopted comfort and safety criteria is provided in **Table 5** and **Table 6**, respectively.

Table 5 Pedestrian Comfort Criteria (Sydney DCP 2012)

Description (see also Notes)	"GEM" Wind Speed 5% Annual Exceedance	
Sitting	4 m/sec	Suitable for promenades, popular recreation areas with seating, reading newspapers, etc.
Standing	6 m/sec	Short duration stationary activities (generally less than 1 hour), including window shopping, waiting areas, etc.
Walking	8 m/sec	for pedestrian thoroughfares, private swimming pools, most communal areas, private balconies and terraces, etc.
Exceeds Comfort Criteria	> 10 m/sec	winds whose force can be felt by the body (branches on trees would be visibly swaying) and where walking will start to become inconvenient or challenging for certain classes of pedestrians, eg the frail, pedestrians holding parcels, parents holding children, etc.

Note: 292 hours is 5 per cent of all hours between 6am and 10pm each day over a year.

Table 6 Pedestrian Safety Criterion (Sydney DCP 2012)

Type of Criteria	Gust Wind Speed Occurring Once Per Year	Activity Concerned
Safety	24 m/s	Knockdown in all trafficable areas

7.2 Comments on the Application of the Acceptability Criteria

Approach for Areas Where Existing Wind Conditions Already Exceed Criteria

In many urban locations, either because of exposure to open upstream conditions or because of street "canyon" effects, etc, the relevant Comfort and Safety criteria may already be currently exceeded.

In such instances, a new development should:

- ideally not exacerbate existing adverse wind conditions; and

- wherever feasible and reasonable, ameliorate such conditions.

For this reason, in the assessment of wind tunnel predictions of wind conditions associated with a newly proposed development, it can be useful to compare the wind microclimate in the "Proposed" condition (ie with the proposed development) with the wind microclimate of the pre-existing "Baseline" condition – as has been done in the present study.

The probabilistic way in which the Comfort Criteria are defined indicates that the relevant activity may be unsuitable at a particular location for about 5% of the time (say around 18 days per year). For the rest of the time, the relevant activity may be suitable (given that winds will be lower than the prescribed acceptability level). Moreover, it is noted that the recommended limiting values for comfort-related wind conditions were generally derived from subjective assessments of wind acceptability. These have been found to vary considerably with the height, strength, age, etc, of the pedestrian concerned.

Accordingly, some latitude can be applied to the Comfort Criteria in particular taking into account the extent of windy conditions, eg some relaxation of the criteria may be acceptable for small areas under investigation which are used infrequently.

The safety criteria shown in **Table 6** reflect the potential for stronger winds to cause a loss of balance and even possible wind knock-down, especially for frail pedestrians. The criteria are accordingly significantly more stringent.

Mitigation Using Landscaping

The Australasian Wind Engineering Society (AWES) Guidelines for Pedestrian Wind Effects Criteria includes advice related to the use of landscaping (trees, shrubs, etc) for mitigation of adverse wind conditions.

In particular, the AWES Guideline notes the following:

- Trees planted in locations where the 24 m/s safety criterion is exceeded are likely to experience wind speeds every 5 years or so which will be sufficient to destroy or severely damage many trees.
- Trees placed in high wind areas therefore have the potential to shed limbs during windstorms, thereby causing a public danger and a public nuisance.
- Moreover, landscaping planted in high wind locations rarely matures to its normal full height necessary for the assumed wind mitigation it will provide.
- Finally, trees located on public footpaths become the responsibility of the local municipality. Their maintenance, replacement following damage, loss of limbs, etc, can become burdensome financially (assuming the Municipality is even aware of such damage) and cannot be guaranteed.

Accordingly, the AWES Guideline does not recommend the use of landscaping when seeking to mitigate wind conditions that equal or exceed the public safety 24 m/s criterion.

8.0 WIND TUNNEL TEST METHODOLOGY

8.1 Simulation of Natural Wind

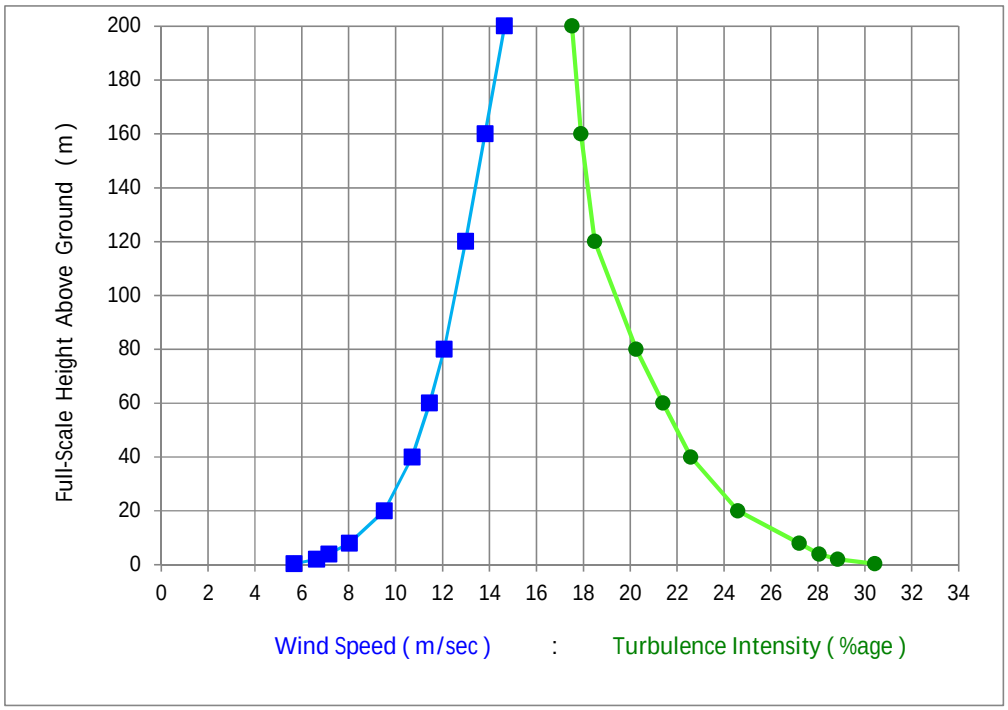
Similarity requirements between the wind tunnel model and prototype (ie full-scale) need to be fulfilled so that similitude in the flow conditions is satisfied. Usually all requirements cannot be satisfied, and compromises need to be made. In this type of wind tunnel test, it is possible to waive strict adherence to the full range of similarity parameters, eg the need to take into account buoyancy effects which are not relevant under strong wind conditions.

The wind tunnel test has been carried out using a geometric length scale of 1:300 for all dimensions (standard wind tunnel test scaling) and by scaling the boundary layer approach wind in the wind tunnel to the same scale as in the atmosphere.

The approach wind was modelled by matching terrain category conditions for all wind directions. In the wind tunnel, this is achieved by an almost 20-metre fetch of appropriate roughness elements.

The upstream profile conditions simulated in the present study is slightly more “urban” than a Suburban Terrain Category 3, associated with the presence of medium density, medium height surroundings. The variation of mean wind speed (blue curve) and turbulence intensity (green curve) is shown in **Figure 5**.

Figure 5 Wind Tunnel Test Profiles of Mean Wind and Turbulence Intensity

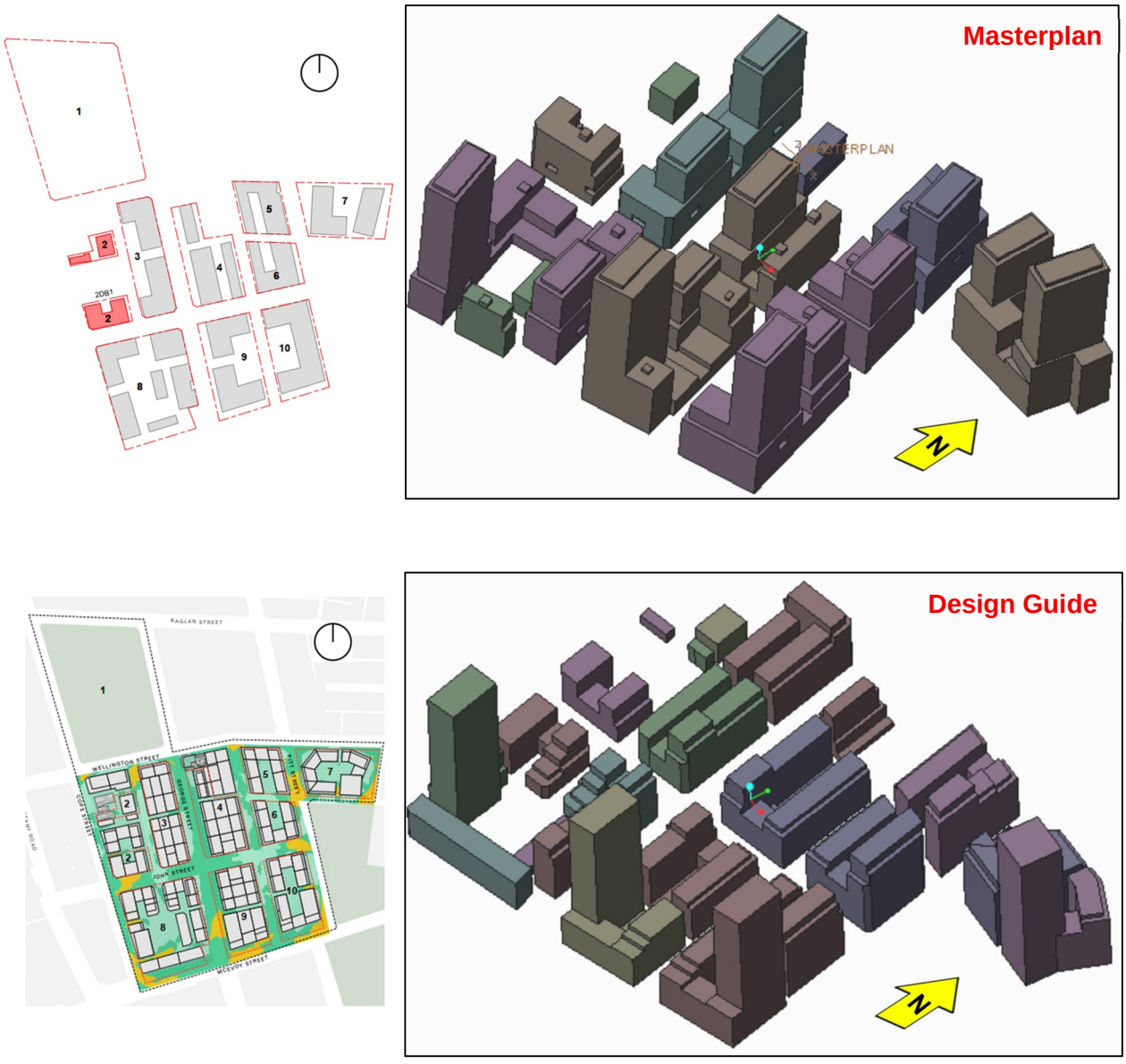


8.2 Proposed Development Models and Proximity Model

8.3 Development Description

SLR Consulting Australia Pty Ltd (SLR) has been commissioned to undertake an environmental wind tunnel study for the proposed development, comprising an assessment of two alternative schemes, namely the *Masterplan* and the *Design Guide* – refer to **Figure 6.**

Figure 6 Building massing for the two schemes: Masterplan and Design Guide.



8.3.1 Development Models

To take into account the influence of the immediate surrounding physical environment, all neighbouring buildings and local topography within a diameter of almost 900 m around the site were included in the purpose-built 1:400 scale "proximity model" used for the test as shown in. 1:400 scale models of the proposed development were built using 3D printing for testing purposes.

The study has involved the testing of the following built environment "scenarios":

- **Scenario 1 – Baseline:** Existing built environment (as at November 2025).
- **Scenario 2 – Masterplan:** Baseline conditions with the proposed Masterplan development.
- **Scenario 3 – Design Guide**: Proposed Design Guide scheme.
- **Scenario 4 – Masterplan with Mitigation:** Baseline conditions with the proposed Masterplan development and recommended wind mitigation measures implemented.
- **Scenario 5 – Masterplan with Mitigation and Approved Future Surrounding Development**: Baseline conditions with the proposed Masterplan development, recommended wind mitigation measures, and approved future surrounding developments included (Waterloo Metro Quarter; 130 Cope St, Waterloo NSW 2017, Australia)

Figure 7 1:400 Scale Proximity Model in Wind Tunnel – "Baseline" Scenario

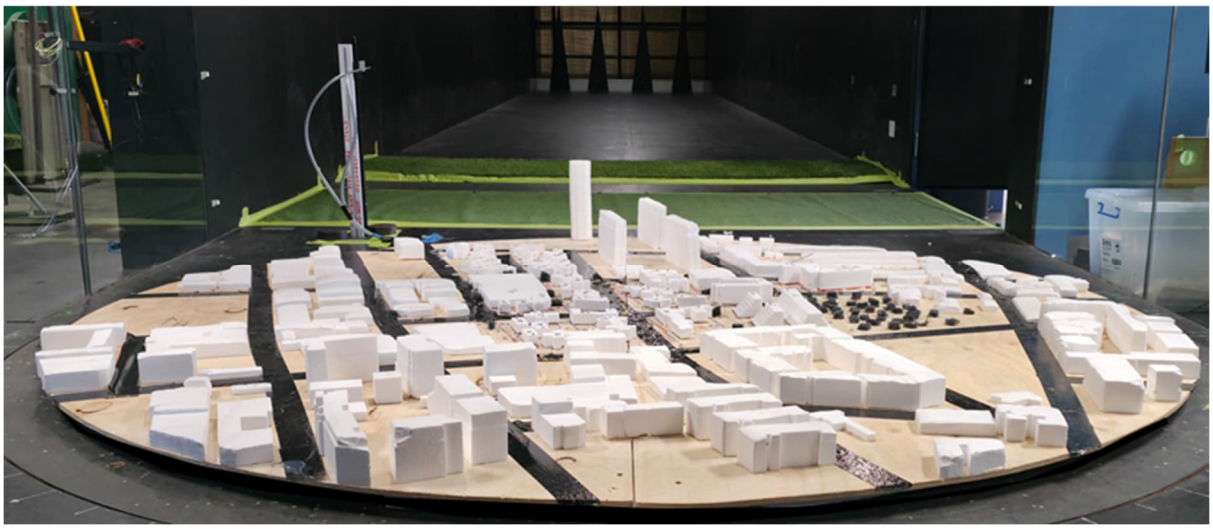
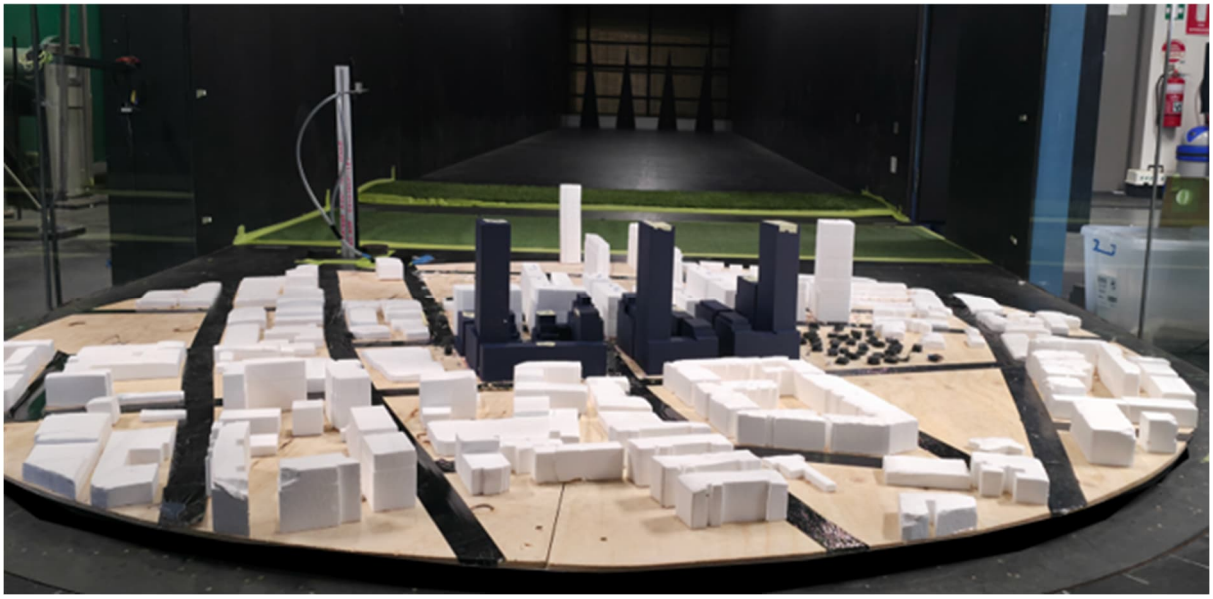


Figure 8 1:400 Scale Proximity Model in Wind Tunnel – "Masterplan" Scenario

View from South

Figure 9 1:400 Scale Proximity Model in Wind Tunnel - "Design Guide" Scenario

View from South



8.4 Data Processing

Wind speed measurements were taken at 10° intervals:
the 0° wind direction is from the north, with east at 90°, south at 180°, etc.

The wind speeds at the locations of interest are measured
in the wind tunnel using Irwin sensors.

Wind speeds in the wind tunnel were measured at a height
corresponding to approximately chest height (1.5 m) in full scale.

The sampling time for each measurement is 60 seconds.

Wind speed measurements are recorded as dimensionless ratios
of the mean and gust ground level velocity to a mean reference wind speed
at a (full-scale) height of 200 m above ground level.

The reader is referred to the publication referenced below for a full description of this technique and validation of Irwin sensor data using hot-wire anemometry.

LTR-LA-242 “A Simple Omni-Directional Sensor for Wind Tunnel Studies of Pedestrian Level Winds” (Irwin, National Aeronautical Establishment, Ottawa, Canada, May 1980)

The measured wind speeds are transformed using the directional wind speed information derived from the local wind climate to yield ground level wind speeds as a function of annual return period and directional mean reference wind speed –. The measured ground level wind speeds thus incorporate both the building and terrain/topographical aspects of the location as well as the directional probability of wind speed for the Project Site. The results are computed on a probabilistic basis, enabling calculation of wind events which will occur at the probability levels relevant to the Comfort Criteria, ie 5% exceedance level on an annual basis, and the peak annual wind speed relevant to 24 m/s Safety Criterion, using the local Project Site statistical wind distribution.

8.5 Test Method – Sensor Locations

In the wind tunnel testing, Irwin wind sensors were positioned at the locations shown in **Figure 10**, **Figure 11** and **Figure 12**.

These locations were chosen as potentially susceptible to adverse wind conditions, eg near building corners, or represent locations of interest throughout the development, eg near primary building entrances and along footpaths.

- Locations 1- 140 were positioned at ground level locations surrounding the site and were measured for all scenarios;
- Locations 141–144 are situated within the selected elevated communal open spaces and rooftop areas. These locations were instrumented with sensors to assess the local wind environment and identify potential adverse wind conditions affecting elevated communal areas on the taller buildings. The selected locations represent key and worst-case wind exposures. The findings will inform the detailed design and any required wind mitigation measures once the architectural drawings are finalised.

Figure 10 Sensor Locations - Baseline

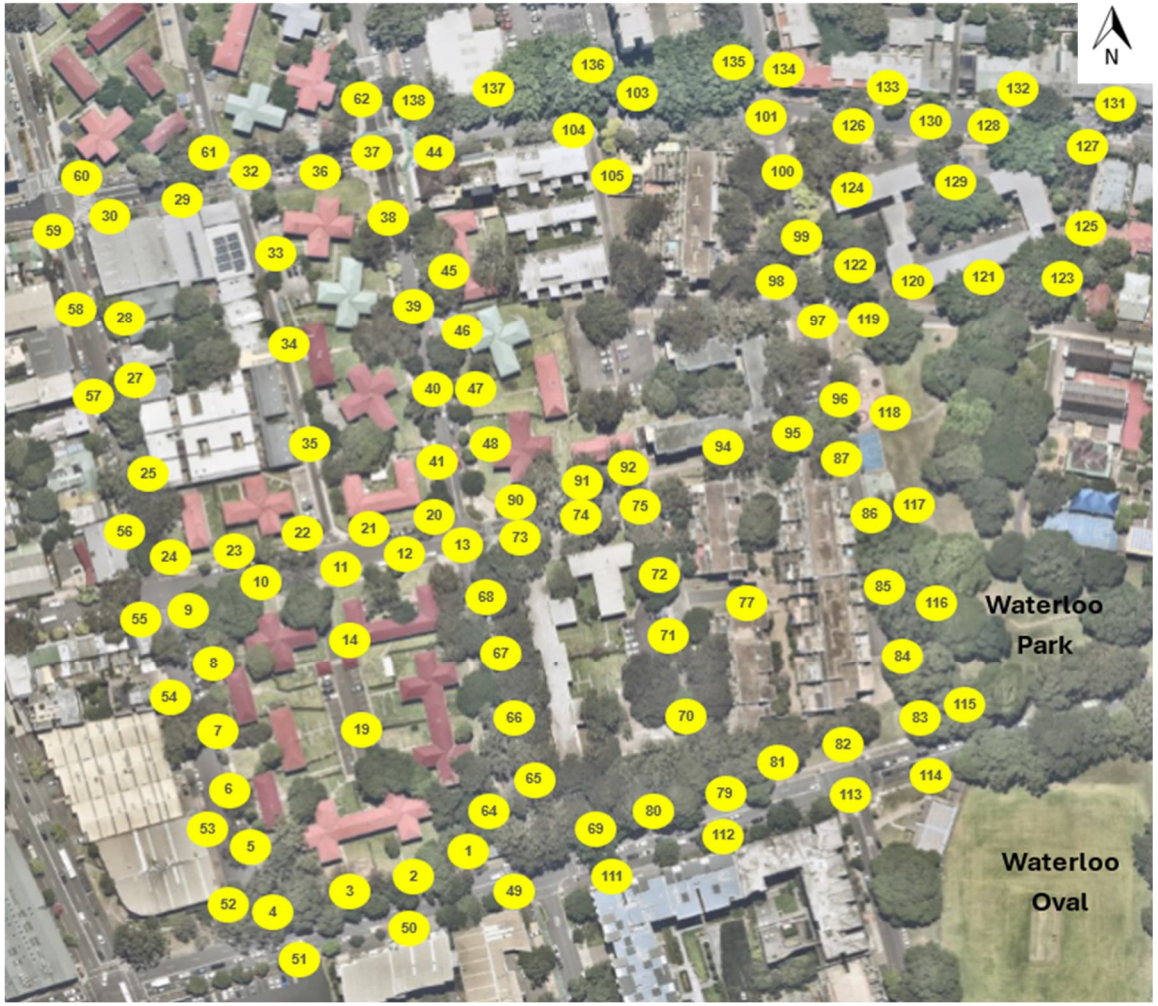


Figure 11 Sensor Locations - Masterplan

Figure 12 Sensor Locations – Design Guide

8.6 Sample Test Result

An example of the test results and interpretation of these results is shown in **Figure 13** illustrating the peak annual mean and representative gust wind speeds at:

Sensor: **Location 10**
Location: within the site

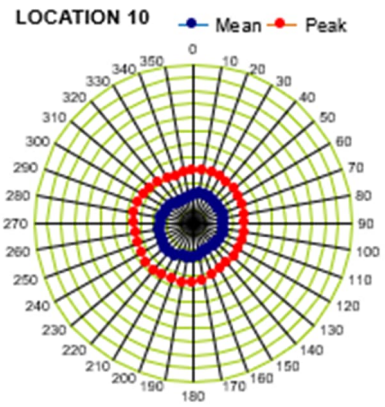
The polar diagram shows the output of the wind tunnel test results in terms of the ratio of local ground level wind speeds to the 200 m height reference mean wind speed:

Mean wind speed ratio: "navy blue" data points.
Gust wind speed ratio: "red" data points.

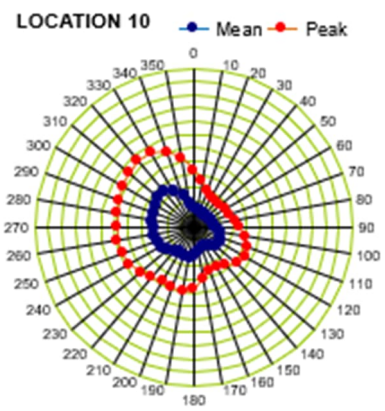
The polar diagram circumferential markings show the above ratios in "0.1" intervals.

Figure 13 Sample Polar Plot Test Result – Location 10

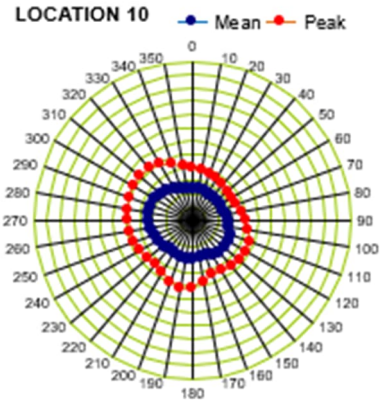
"Baseline" Scenario



"Masterplan" Scenario



"Design Guide" Scenario



"Baseline" Scenario

- Location 10 encounters a moderate increase in the speed of winds blowing from the northeast direction.

"Masterplan" Scenario

- Location 10 experiences a rise in the velocity of north-westerly winds as a result of non-shielding wind flows directed towards the northern side of the site and downwash winds off the northern façade of Block 8.

"Design Guide" Scenario

- Under the Design Guide scheme, Location 10 continues to be influenced by north-westerly winds; however, wind speed increases are primarily driven by the exposed northern site edge and residual downwash effects from Block 8, resulting in elevated but more moderated wind conditions compared with the Masterplan scenario.

8.7 Calculation Methodology

As described in previous sections, the wind tunnel results are processed as follows:

- The wind tunnel test data yield ratios of the local ground level wind speed (mean and peak gust) to the reference height (200 m full-scale) mean wind speed (refer **Figure 5**) in the wind tunnel.
- The local Project Site wind speed and wind direction probability distribution is then used to calculate the probability of occurrence of the "GEM" wind speeds at an annual exceedance level of 5% to compare to the comfort criteria and the peak annual gust to compare to the safety criterion.

8.8 Wind Tunnel Test Data - All Scenarios

Appendices B, C and **D** present the relevant wind tunnel test result polar plots for all locations across all scenario test runs.

Note that the polar plots are the ratios of the local ground level wind speed (mean and peak gust) to the reference height (200 m full-scale) mean wind speed (refer **Figure 5**) in the wind tunnel, and do not take into account the directional “strength” characteristics of the Project site wind rose.

9.0 TEST RESULTS

9.1 Predicted Safety Criteria Levels

The results of the combination of wind tunnel test results (local ground level wind speed ratios) with the wind speed and wind direction probability distribution (peak annual gust) relevant to safety yielded the following results:

- In the “Baseline” scenario, the **peak annual gust at ALL locations** around the site are below the 24 m/s safety criterion level,
- In the “Proposed” scenario, **peak annual gusts at ALL locations** around the site continue to remain below the 24 m/s safety criterion level.

It should be noted that the above tests were conducted in the absence of the proposed landscaping elements.

9.2 Predicted Comfort Criteria Levels

The results of the combination of wind tunnel test results (local ground level wind speed ratios) with the wind speed and wind direction probability distribution (5% annual exceedance level) derived for the site compared to the Comfort criteria are shown in **Figure 14** to **Figure 16.**

Figure 14 Predicted Comfort Levels - "Baseline" Scenario

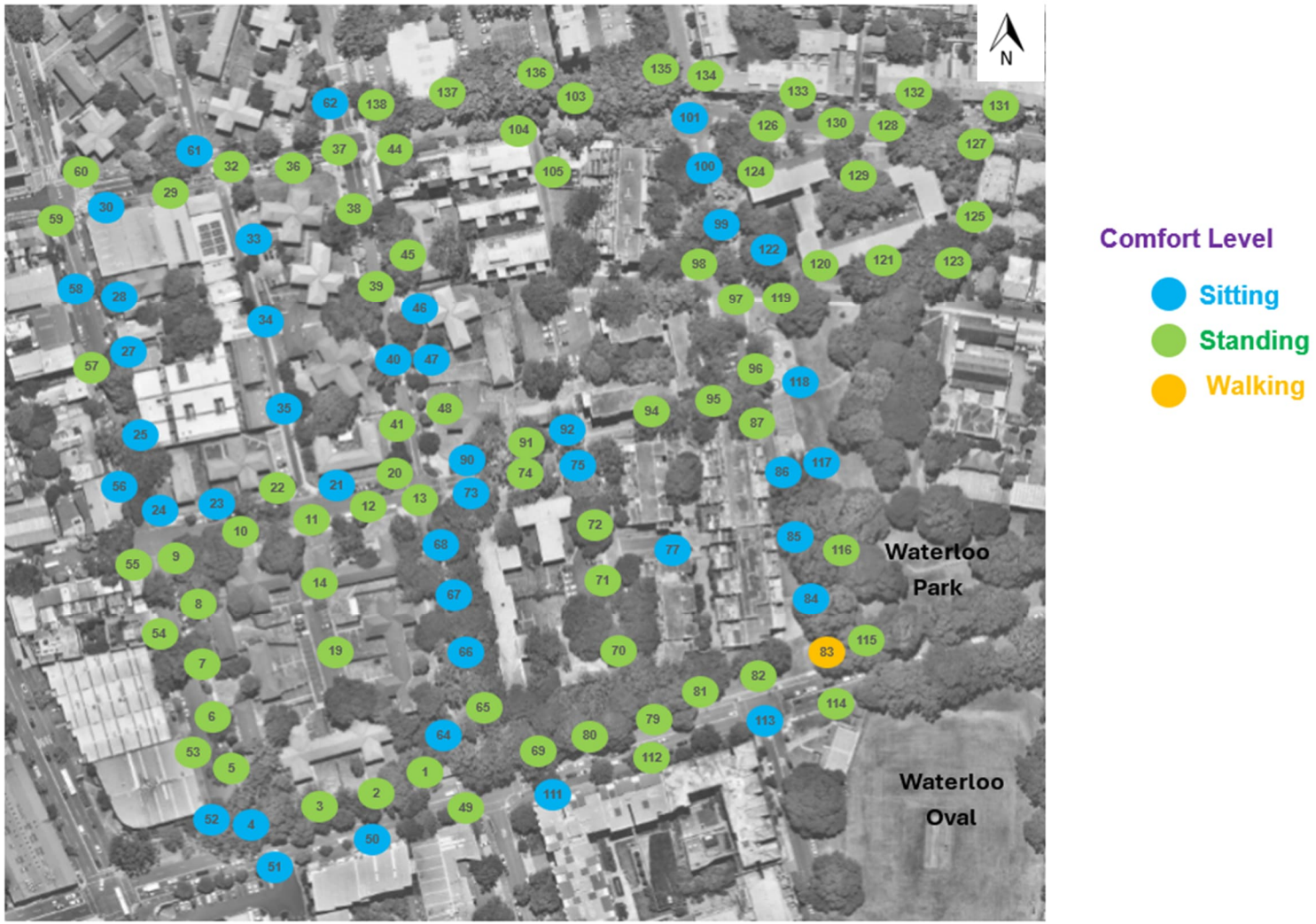


Figure 15 Predicted Comfort Levels - "Masterplan" Scenario

Figure 16 Predicted Comfort Levels - “Design Guide” Scenario

9.2.1 Impact of the Proposed Development on Existing Wind Conditions

Table 7 presents a comparison between the wind-tunnel predicted comfort levels for ALL scenarios, as well as the locations within the proposed development and the elevated communal terrace areas.

"Baseline" Scenario

- As noted above, NO locations are predicted to experience winds which exceed the Safety Criterion,
- All locations surrounding the site generally remain at the Strolling or Standing or sitting category.

"Masterplan and Design Guide" Scenarios

- As noted above, NO locations are predicted to experience winds which exceed the Safety Criterion,
- All locations surrounding the site generally remain at the Strolling or Standing or Walking category.

9.2.2 Impact of the Proposed Development Relative to Target Comfort Levels

It is noted that none of the landscaping proposed for the development was included in the "Proposed" built environment scenarios. Testing in their absence assists in confirming areas where wind mitigation may be needed and more importantly, using the polar plot information shown in **Appendices B** to **F**, revealing the wind directions of most concern, further assisting the decision making in relation to placement of specific landscaping elements.

As summarised in **Table 7** several locations benefit from wind shielding provided by the surrounding building forms and are shown to meet the relevant wind comfort criteria under both the Masterplan and Design Guide scenarios. While certain locations exhibit comparatively different wind responses between the two scenarios, neither is predicted to exceed the applicable pedestrian safety criteria. Overall, the results indicate that each scheme presents location-specific wind performance characteristics, with variations in sheltering and exposure depending on the local built form. Accordingly, the findings provide a robust basis for a design guide that can be applied once the architectural design is finalised, allowing wind mitigation strategies to be refined in line with the intended use of each area, such as seating zones, building entrances, and outdoor dining spaces and etc.

Table 7 Assessment of Impacts – Wind Tunnel Predicted Comfort Level of "Baseline", "Masterplan" and "Design Guide" Scenarios

Location	"Baseline"	"Masterplan"	"Design Guide"
1	STANDING	STANDING	STANDING
2	STANDING	STANDING	STANDING
3	STANDING	WALKING	STANDING
4	SITTING	WALKING	STANDING
5	STANDING	STANDING	STANDING
6	STANDING	STANDING	STANDING
7	STANDING	STANDING	STANDING
8	STANDING	WALKING	WALKING
9	STANDING	STANDING	STANDING
10	STANDING	STANDING	STANDING
11	STANDING	STANDING	STANDING
12	STANDING	WALKING	WALKING
13	STANDING	STANDING	STANDING
14	STANDING	WALKING	STANDING
15	Note	STANDING	WALKING
16		WALKING	WALKING
17		STANDING	STANDING
18		WALKING	WALKING
19	STANDING	WALKING	STANDING
20	STANDING	STANDING	STANDING
21	SITTING	STANDING	STANDING
22	STANDING	STANDING	STANDING
23	SITTING	STANDING	STANDING
24	SITTING	STANDING	STANDING
25	SITTING	STANDING	STANDING
26	Note	STANDING	STANDING
27	SITTING	SITTING	STANDING
28	SITTING	SITTING	SITTING
29	STANDING	STANDING	STANDING
30	SITTING	SITTING	SITTING
31	Note	STANDING	STANDING
32	STANDING	STANDING	STANDING
33	SITTING	STANDING	STANDING
34	SITTING	SITTING	SITTING
35	SITTING	STANDING	STANDING
36	STANDING	STANDING	STANDING
37	STANDING	WALKING	STANDING
38	STANDING	STANDING	SITTING
39	STANDING	STANDING	SITTING
40	SITTING	STANDING	SITTING
41	STANDING	STANDING	STANDING
42	Note	STANDING	STANDING
43		STANDING	STANDING
44	STANDING	STANDING	STANDING
45	STANDING	STANDING	SITTING

Location	"Baseline"	"Masterplan"	"Design Guide"
46	SITTING	STANDING	SITTING
47	SITTING	SITTING	SITTING
48	STANDING	SITTING	STANDING
49	STANDING	SITTING	STANDING
50	SITTING	STANDING	STANDING
51	SITTING	STANDING	STANDING
52	SITTING	STANDING	SITTING
53	STANDING	WALKING	STANDING
54	STANDING	STANDING	STANDING
55	STANDING	WALKING	STANDING
56	SITTING	SITTING	SITTING
57	STANDING	STANDING	STANDING
58	SITTING	SITTING	SITTING
59	STANDING	SITTING	SITTING
60	STANDING	STANDING	STANDING
61	SITTING	STANDING	STANDING
62	SITTING	STANDING	STANDING
64	Note	WALKING	STANDING
65	SITTING	STANDING	STANDING
66	STANDING	STANDING	STANDING
67	SITTING	SITTING	SITTING
68	SITTING	SITTING	SITTING
69	SITTING	WALKING	WALKING
70	STANDING	WALKING	WALKING
71	STANDING	STANDING	STANDING
72	STANDING	STANDING	STANDING
73	STANDING	SITTING	SITTING
74	SITTING	STANDING	STANDING
75	STANDING	STANDING	STANDING
76	SITTING	WALKING	STANDING
77	Note	STANDING	STANDING
78	SITTING	WALKING	STANDING
79	Note	WALKING	WALKING
80	STANDING	WALKING	STANDING
81	STANDING	WALKING	WALKING
82	STANDING	WALKING	WALKING
83	STANDING	WALKING	WALKING
84	WALKING	STANDING	STANDING
85	SITTING	STANDING	STANDING
86	SITTING	STANDING	STANDING
87	SITTING	WALKING	STANDING
88	STANDING	WALKING	WALKING
89	Note	WALKING	WALKING
90		SITTING	SITTING
91	SITTING	STANDING	STANDING
92	STANDING	STANDING	SITTING
93	SITTING	STANDING	SITTING

Location	"Baseline"	"Masterplan"	"Design Guide"
94	Note	WALKING	STANDING
95	STANDING	WALKING	STANDING
96	STANDING	WALKING	STANDING
97	STANDING	STANDING	STANDING
98	STANDING	STANDING	STANDING
99	STANDING	WALKING	STANDING
100	SITTING	STANDING	STANDING
101	SITTING	STANDING	STANDING
102	SITTING	WALKING	STANDING
103	Note	WALKING	WALKING
104		STANDING	STANDING
105	STANDING	STANDING	STANDING
106	STANDING	STANDING	SITTING
107	Note	STANDING	STANDING
108		STANDING	STANDING
109		STANDING	STANDING
110		STANDING	SITTING
111		SITTING	SITTING
112	SITTING	STANDING	STANDING
113	STANDING	STANDING	STANDING
114	SITTING	STANDING	STANDING
115	STANDING	STANDING	STANDING
116	STANDING	WALKING	STANDING
117	STANDING	STANDING	STANDING
118	SITTING	STANDING	STANDING
119	SITTING	STANDING	STANDING
120	STANDING	WALKING	WALKING
121	STANDING	STANDING	STANDING
122	STANDING	STANDING	STANDING
123	SITTING	WALKING	WALKING
124	STANDING	STANDING	STANDING
125	STANDING	WALKING	WALKING
126	STANDING	STANDING	STANDING
127	STANDING	STANDING	STANDING
128	STANDING	STANDING	STANDING
129	STANDING	STANDING	STANDING
130	STANDING	STANDING	STANDING
131	STANDING	STANDING	STANDING
132	STANDING	STANDING	STANDING
133	STANDING	STANDING	STANDING
134	STANDING	STANDING	STANDING
135	STANDING	STANDING	STANDING
136	STANDING	STANDING	STANDING
137	STANDING	STANDING	STANDING
138	STANDING	STANDING	STANDING
139	STANDING	STANDING	STANDING
140	STANDING	STANDING	STANDING

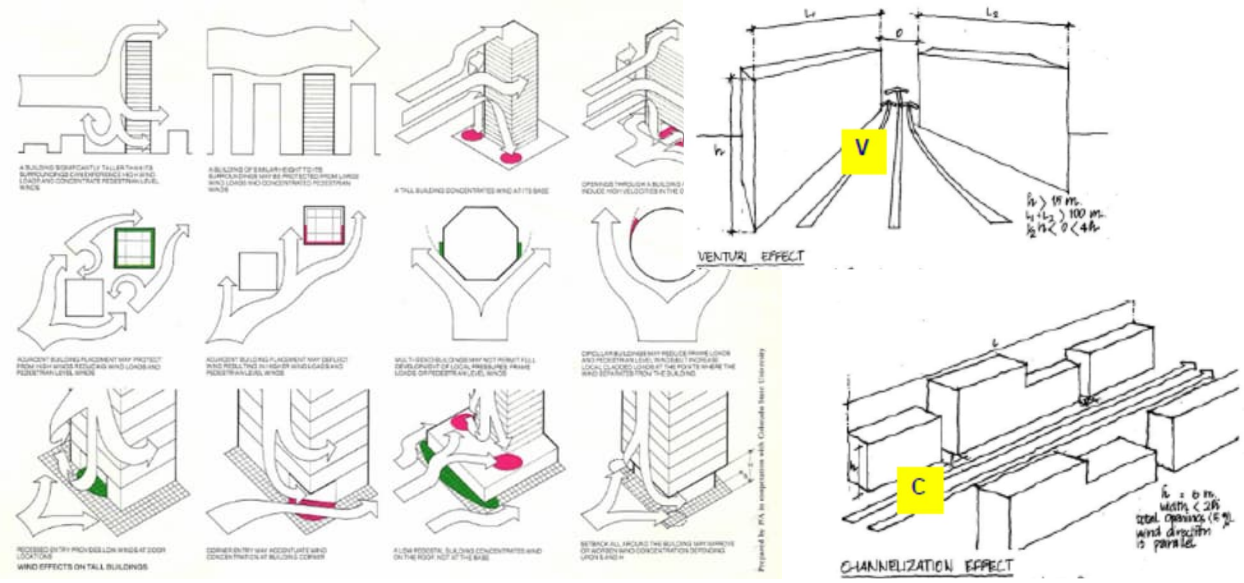
Location	"Baseline"	"Masterplan"	"Design Guide"
141	STANDING	WALKING	WALKING
142	STANDING	WALKING	WALKING
143	STANDING	WALKING	WALKING
144	STANDING	WALKING	WALKING
145	STANDING	WALKING	WALKING
146	STANDING	WALKING	WALKING

Note These are INTERNAL or ELEVATED Development locations and hence only included in the "Proposed" scenario.

10.0 WIND MITIGATION OPTIONS

Figure 17 shows some common wind impact flow patterns surrounding a new building development.

Figure 17 Common Built Environment Windflow Patterns



On the basis of the above, wind mitigation options generally fall into two categories:

- Windbreaks designed to mitigate **vertical or oblique** winds (eg downwash winds); and
- Windbreaks designed to mitigate **horizontal** winds (eg channelling/funnelling winds).

10.1 Windbreaks Suited to Mitigating Vertical/Oblique Winds

Wind mitigation options suited to ameliorating vertical/oblique wind conditions include:

- Horizontal (or near horizontal) Canopies, Awnings and Pergolas (solid or of moderate porosity) which are able to deflect winds approaching from above and redirect the wind away from ground level areas below.

10.2 Windbreaks Suited to Mitigating Horizontal Winds

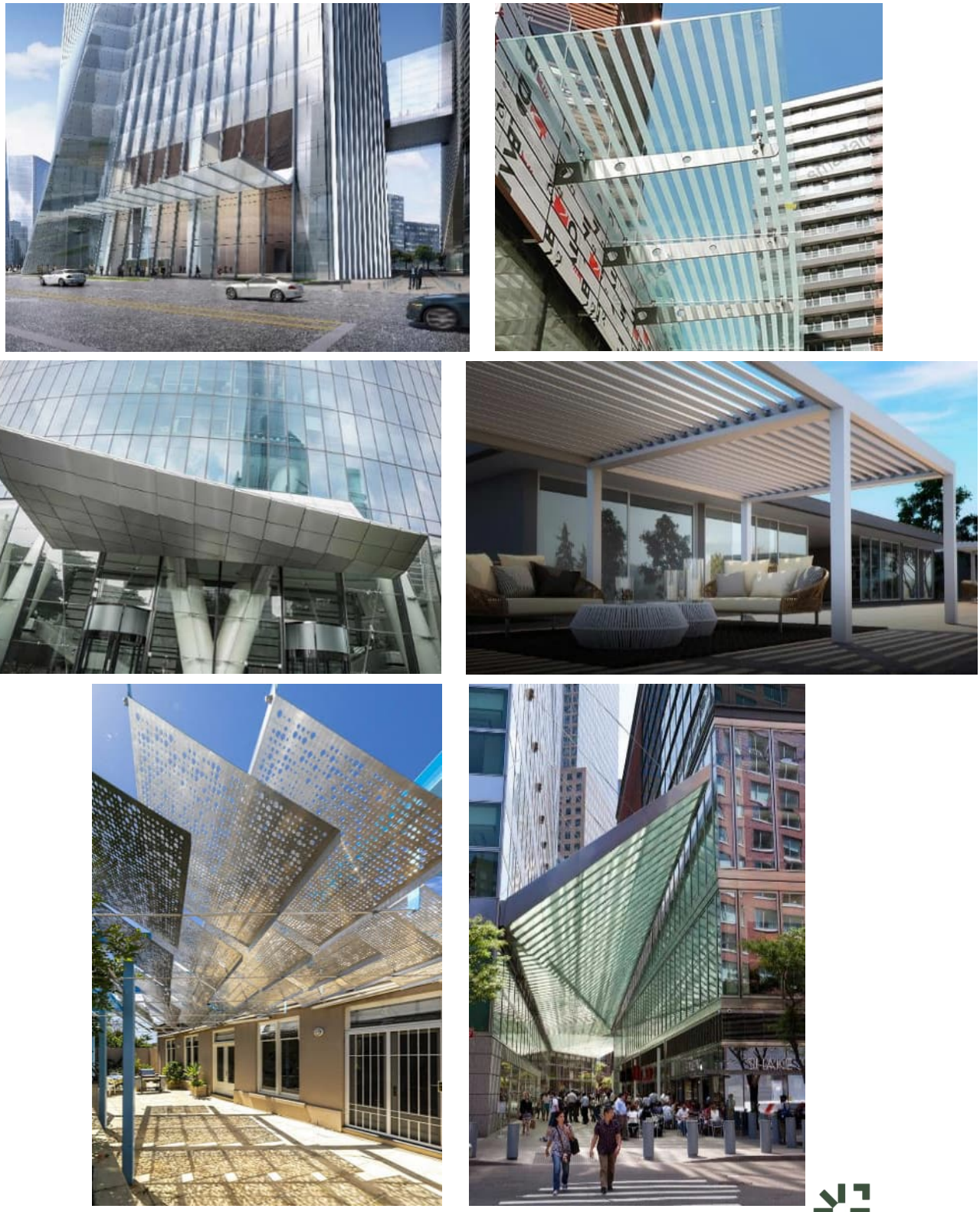
Wind mitigation options suited to ameliorating horizontal wind conditions include:

- Landscaping: trees, shrubs, vegetation, etc; and
- Sculptural screening (solid or of moderate porosity) – which can also be combined with landscaping.

10.3 Horizontal Windbreak Examples

Figure 18 shows typical examples of horizontal windbreak options typically found in urban built environments – they can be solid or porous, purely horizontal or with a slope aimed at deflecting oblique windflow.

Figure 18 Horizontal Windbreak Options

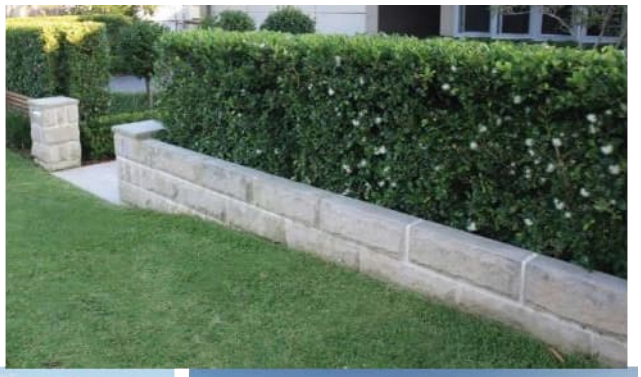


10.4 Vertical Windbreak Examples

Figure 19 shows examples of vertical windbreak options found in urban built environments – they can be solid or porous, involve landscaping (full or partial), timber, glazing, etc, and can provide a wide range of utilitarian functions beyond their wind mitigation capability (eg seating, advertising, etc).

Figure 19 Vertical Windbreak Options

Landscaping



Solid

Multi-Function

Combination

11.0 MITIGATION AND TREATMENT RECOMMENDATIONS

Sections 8 and **9** provided guidance as to the areas where the adopted wind acceptability criteria had the potential to be exceeded and an indication as to the likely local optimum wind treatment strategy, eg whether the wind condition of interest is likely to arise from accelerating winds which require vertical windbreaks (such as landscaping) or downwash winds which require horizontal windbreaks (such as awnings, canopies).

By conducting an additional round of testing encompassing all sensor locations and spanning from 0° to 360°, the Mitigation scenarios evaluated the effectiveness of proposed windbreak treatments, including landscaping (which was not included in the initial testing), along with supplementary wind mitigation measures.

11.1 Wind Mitigation Recommendations – refer Figure 20 and Figure 21

The following wind mitigation recommendations are proposed to manage adverse wind effects and to ensure that pedestrian comfort and safety objectives are achieved for the development.

Surrounding public domain

- Maintain the proposed and existing trees/landscaping within and on the sides of the development to mitigate the impact of local wind speeds. Additionally, it is advisable to include additional trees in the open spaces at ground level to enhance wind mitigation. All proposed landscaping should consist of evergreen and densely foliated vegetation to ensure its effectiveness year-round.
- Maintain the proposed ground-level setbacks and awnings at building entrances to help reduce downwash and redirect airflow away from pedestrian pathways.
- Position the outdoor dining areas beneath the undercroft (or the proposed awnings) to minimise downwash effects.
- Positioning ground-level seating areas on communal open space beneath overhead windbreaks—such as pergolas, shade structures, or large-canopy trees—to minimise wind exposure and mitigate façade downwash effects.

Selected elevated communal open spaces (Refer to the red dashed lines shown in Figure 20 and Figure 21)

- A number of selected rooftop locations have been instrumented with sensors (141-146) to investigate the local wind environment and to identify any potential adverse wind conditions affecting potential elevated communal open spaces on the taller buildings within the site. These locations were strategically chosen to capture representative and worst-case wind exposures. The results obtained from this assessment will be used to inform and guide the detailed design, including the identification and refinement of any additional wind mitigation measures, once the architectural drawings are finalised. In the absence of mitigation measures, these areas are expected to experience uncomfortable wind conditions. While they serve as secondary or incidental spaces that can be managed operationally during windy periods, it is recommended to include vertical windbreaks at least 1.8 m high along the outer edges. These could consist of balustrades, solid walls, planters, or trees of equivalent height, strategically placed along exposed boundaries to improve wind comfort.

Private balconies

The wind environment for the private balconies will be assessed as part of the Development Application for each individual building, following the progression of the detailed façade design. This assessment will take into account the final building form, façade articulation, balcony geometry, balustrade and screening treatments, and other relevant architectural features that may influence local wind conditions. The outcomes of this analysis will be used to determine the necessity, type, and extent of any building-specific wind mitigation measures required to ensure that private balcony spaces achieve acceptable wind comfort and safety criteria in accordance with relevant planning controls and best-practice guidelines

Figure 20 Wind Mitigation for the Development – Masterplan Scenario (& Masterplan with future building Scenario)

Maintain the proposed landscaping/trees (Ensure the street trees are at least 3m in height with a generous canopy). Recommended landscaping involves evergreen and densely leafed plants to maintain year-round shelter effectiveness.

Based on the wind tunnel test results, the introduction of additional trees and landscaping within this area is not expected to materially change the applicable wind comfort category. However, these measures are anticipated to reduce local wind speeds and decrease the frequency and severity of exceedances relative to the nominated wind comfort criterion.

Add more trees here and locate long-term stationary outdoor areas beneath trees. Also positioning ground-level seating areas on communal open space beneath overhead windbreaks—such as pergolas, shade structures, or large-canopy trees—to minimise wind exposure and mitigate façade downwash effects.

Maintain the building setbacks above entrances and along pedestrian pathways surrounding the buildings.

Retain the proposed awnings.

Install at least 1.8m-high vertical windbreak around the outer edge of the selected elevated communal open space to achieve the required comfort criterion.

Figure 21 Wind Mitigation for the Development – Design Guide Scenario

Maintain the proposed landscaping/trees (Ensure the street trees are at least 3m in height with a generous canopy). Recommended landscaping involves evergreen and densely leafed plants to maintain year-round shelter effectiveness.

Based on the wind tunnel test results, the introduction of additional trees and landscaping within this area is not expected to materially change the applicable wind comfort category. However, these measures are anticipated to reduce local wind speeds and decrease the frequency and severity of exceedances relative to the nominated wind comfort criterion.

Add more trees here and locate long-term stationary outdoor areas beneath trees. Also positioning ground-level seating areas on communal open space beneath overhead windbreaks—such as pergolas, shade structures, or large-canopy trees—to minimise wind exposure and mitigate façade downwash effects.

Maintain the building setbacks above entrances and along pedestrian pathways surrounding the buildings.

Retain the proposed awnings.

Install at least 1.8m-high vertical windbreak around the outer edge of the elevated communal open space to achieve the required comfort criterion.

11.2 Mitigation" Outcome – Predicted Comfort Levels

The results of the combination of wind tunnel test results (local ground level wind speed ratios) with the wind speed and wind direction probability distribution (5% annual exceedance level) derived for the site compared to the comfort criteria for the "Mitigation" scenario are shown in **Figure 22.**

Figure 22 Predicted Comfort Levels – "Masterplan with Mitigation" Scenario

12.0 The Cumulative Impact of Future (Approved) Buildings, Scenario 5

In the final scenario, a future building (Waterloo Metro Quarter; 130 Cope St, Waterloo NSW 2017, Australia) has been incorporated on the north-west side of the site. Overall, the influence of this future development on the wind environment is not significant; however, an increase in wind channelling under north-westerly winds is observed at Sensors 27, 28, 29, 30, 31, and 32. Notwithstanding this localised effect, wind conditions at all of these locations remain within the applicable pedestrian safety criteria. Once the future building is included and the final design is resolved, the results can be used as a guideline to inform the appropriate use of each location, based on its intended function in the final development.

Figure 23 Predicted Comfort Levels – "Masterplan with Mitigation and future building" Scenario

13.0 Conclusion

This quantitative wind assessment report is submitted to the Department of Planning, Housing and Infrastructure (the Department) on behalf of Stockland and Homes NSW (previously known as the Land and Housing Corporation) (the Applicant), and accompanies the State Assessed Rezoning Proposal and Concept State Significant Development Application (SSDA) for the redevelopment of the site within the Waterloo Estate (South), hereafter referred to as 'Waterloo South'.

The assessment has been carried out via a Discrete Sensor Environmental Wind Tunnel Study whereby wind tunnel measurements were made to investigate wind conditions throughout and around the proposed development (simulated via a 1:400 scale model) at areas to be used by visitors and occupants of the development itself.

Built Environment Scenarios Assessed

The Proximity Models used in the testing, simulate all the following Scenarios:

- **Scenario 1 – Baseline:** Existing built environment (as at November 2025).
- **Scenario 2 – Masterplan:** Proposed Masterplan with the existing surrounding buildings.
- **Scenario 3 – Design Guide**: Proposed Design Guide scheme. with the existing surrounding buildings.
- **Scenario 4 – Masterplan with Mitigation:** Proposed Masterplan with existing surrounding buildings, proposed Landscaping and mitigation treatments.
- **Scenario 5 – Masterplan with Mitigation and Approved Future Surrounding Development**: Proposed development with cumulative surrounding buildings, proposed landscaping and mitigation treatments. The future surrounding developments included Waterloo Metro Quarter; 130 Cope St, Waterloo NSW 2017, Australia

It is noted that none of the landscaping proposed for the development was included in Scenario 1 to Scenario 3.

Wind Acceptability Criteria

The criteria adopted for the present study are:

Pedestrian Safety and Comfort Criteria (Sydney DCP 2012)

Site Wind Climate

Using long-term wind records obtained from nearby Bureau of Meteorology stations at Bankstown Airport and Sydney Kingsford Smith Airport, SLR has determined that local upper-level winds reflective of the weather systems experienced at the site have characteristics similar to those of Sydney (Kingsford Smith) Airport, given the site's relatively close distance to the airport and similar distance inland.

"Baseline" Scenario

- The site is currently surrounded by a mix of low- to mid-rise residential dwellings and commercial buildings to most directions.

- NO locations are predicted to experience winds which exceed the Safety Criterion.
- All locations surrounding the site generally remain at the Strolling or Standing or sitting category. Refer **Figure 14** and **Table 7**.

"Masterplan Design Guide" Scenario 1 to Scenario 3

- NO locations are predicted to experience winds which exceed the Safety Criterion,
- Many locations benefit from wind shielding provided by the surrounding building forms for both the Masterplan and Design Guide scenarios
- With the retention of the already planned canopy, all locations surrounding the site generally remain at the Strolling or Standing or walking category. Refer **Figures 14-15** and **Table 7**
- Overall, the results indicate that each scheme presents location-specific wind performance characteristics, with variations in sheltering and exposure depending on the local built form. Accordingly, the findings provide a robust basis for a design guide that can be applied once the architectural design is finalised during the development application, allowing wind mitigation strategies to be refined in line with the intended use of each area, such as seating zones, building entrances, and outdoor dining spaces and etc.

"Masterplan Design Guide" Scenario 4

Ground level

- As previously stated, all locations surrounding the site generally remain at the Strolling or Standing or walking category.
- Within the surrounding public domain, the retention and enhancement of evergreen landscaping, together with appropriate ground-level setbacks, awnings, and sheltered locations for seating and dining, will be effective in mitigating local wind speeds and managing façade downwash along pedestrian routes. Refer **Figure 20** to **Figure 23**
- The proposed landscaping elements provide further improvements to the wind environment and offer additional design flexibility when finalising the architectural drawings for each proposed building.

Elevated Communal Open Space

- For elevated communal open spaces, targeted measurements at representative and worst-case rooftop locations demonstrate that, without mitigation, these areas may experience uncomfortable wind conditions. However, the provision of perimeter vertical windbreaks with a minimum height of 1.8 m—integrated through balustrades, screens, planters, or vegetation—will significantly improve wind comfort and support their intended use. These findings provide clear guidance for the detailed design of rooftop and podium-level communal areas. see **Figure 20** to **Figure 23**

Private Balcony

- The wind environment for private balconies will be addressed at the Development Application stage for each individual building, once the detailed façade and balcony designs are finalised.

- This future assessment will consider the final building form, façade articulation, balcony geometry, and screening treatments, ensuring that any required building-specific wind mitigation measures are incorporated to achieve acceptable comfort and safety criteria.

The Cumulative Impact of Future (Approved) Buildings, Scenario 5

- The inclusion of a future development on the north-west side of the site has been shown to have no material impact on overall pedestrian safety. While localised increases in wind channelling under north-westerly winds are observed at a small number of locations, all assessed areas remain within the applicable safety thresholds. Refer Figure 23

Summary

Based on the analysis, the proposed development (the Master Plan or the Design Guide) will result in increased wind levels within the site and higher wind speeds along the adjacent walkways. However, with the already planned and proposed wind mitigation measures, the Masterplan is expected to meet the nominated Wind Acceptability criteria.

14.0 Feedback

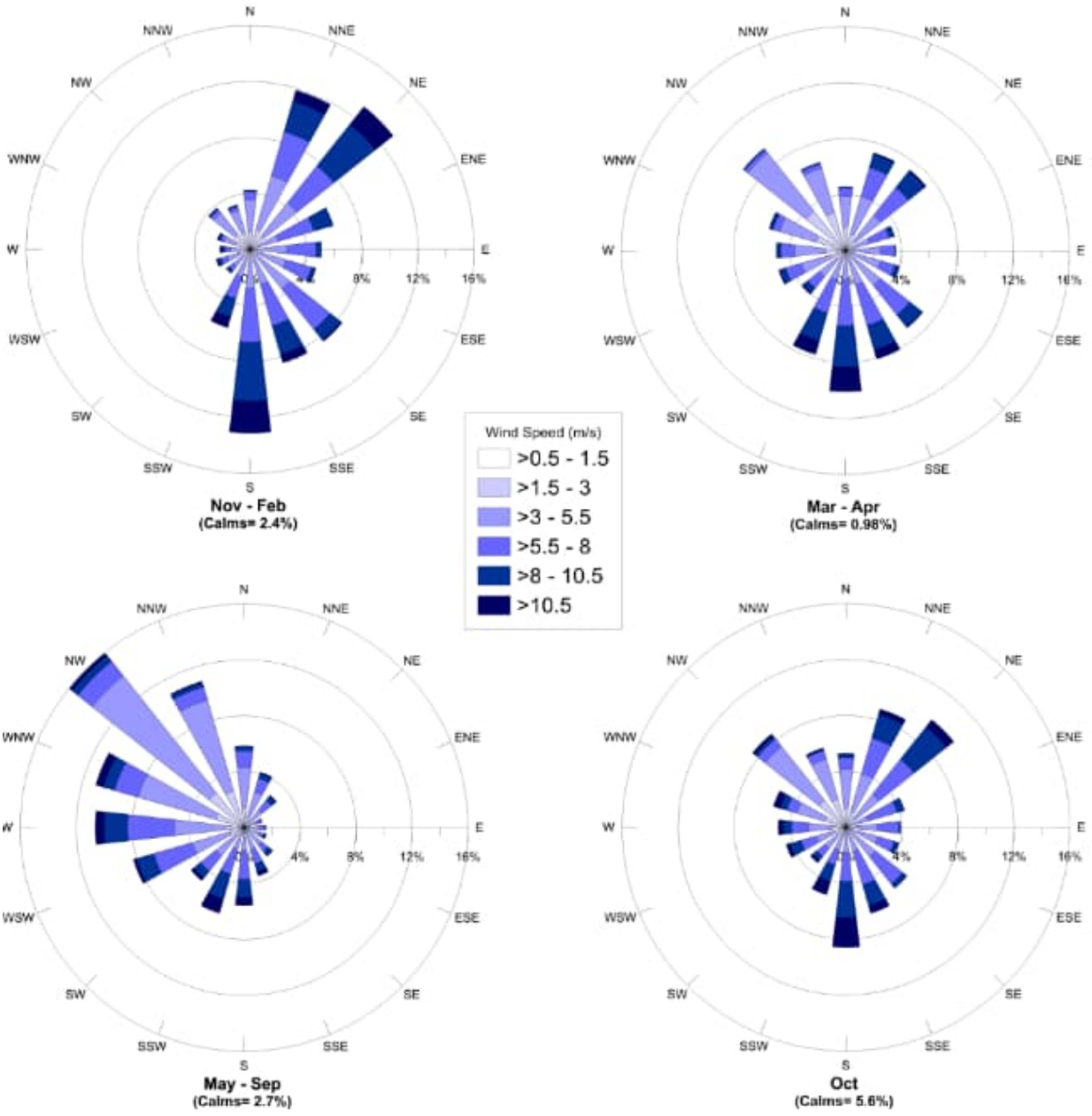
At SLR, we are committed to delivering professional quality service to our clients. We are constantly looking for ways to improve the quality of our deliverables and our service to our clients. Client feedback is a valuable tool in helping us prioritise services and resources according to our client needs.

To achieve this, your feedback on the team's performance, deliverables and service are valuable and SLR welcome all feedback via https://www.slrconsulting.com/en/feedback.

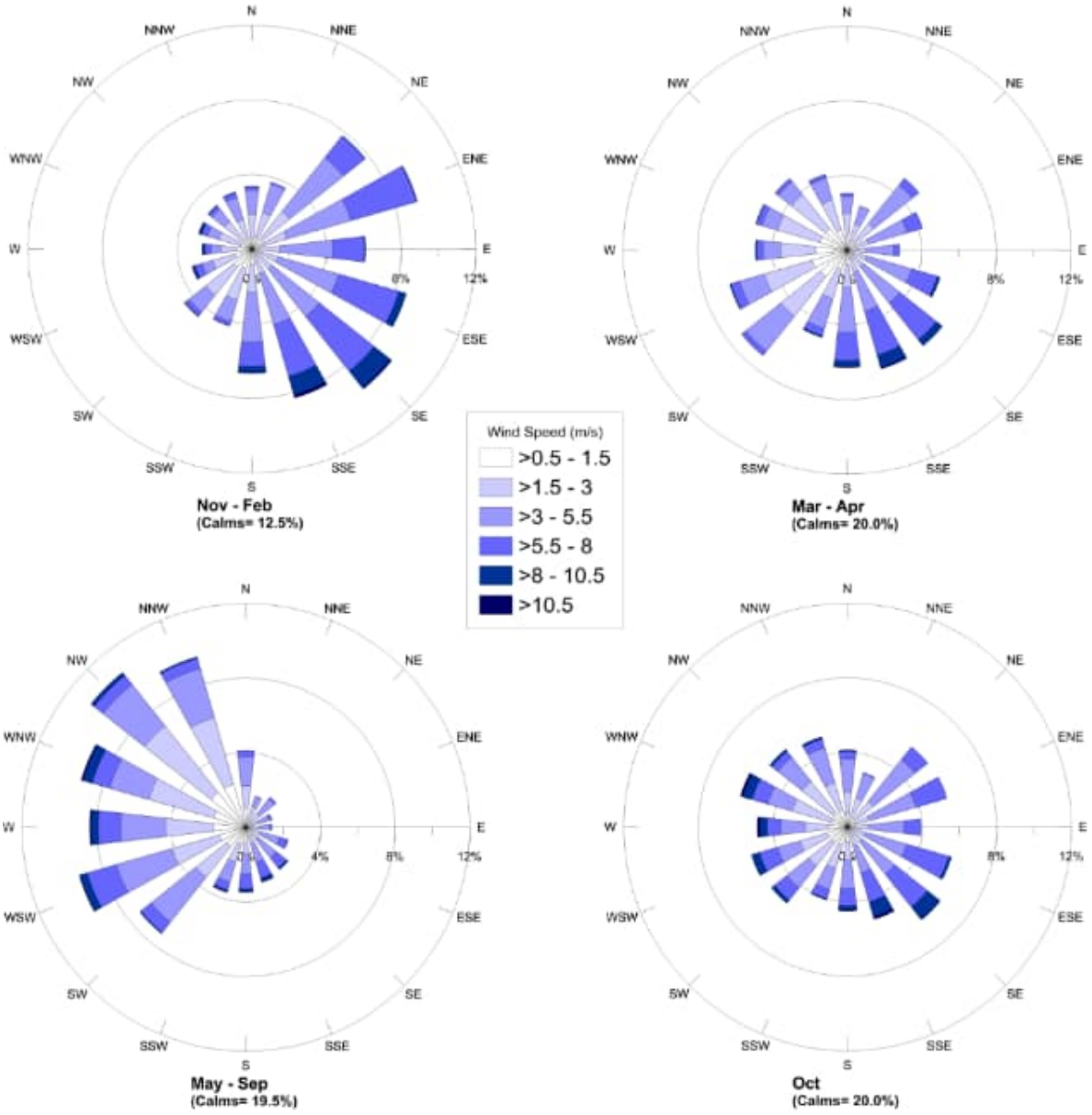
We recognise the value of your time and we will make a $10 donation to our Charity Partner - Lifeline, for every completed form.

Appendix A Seasonal Wind Roses for Bureau of Meteorology Met Stations at Sydney (Kingsford Smith) Airport and Bankstown Airport

Sydney Airport AWS
(Observations)
1999-2017
600.09300



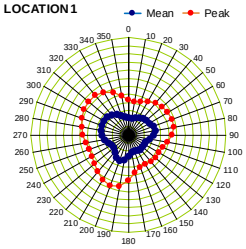
Bankstown Airport AWS
(Observations)
1999-2017
600.09300



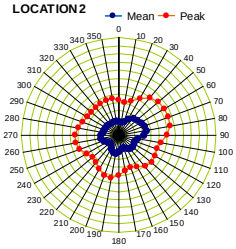
Appendix B Wind Tunnel Test Data (Polar Plots) – BASELINE Scenario

The polar diagram plots show the local (ground level) mean and peak gust wind speed as a ratio of the mean reference wind speed (at a full-scale height of 200 m).The polar diagram circumferential lines representing gradations in 0.1 intervals, ie 10% ratios.

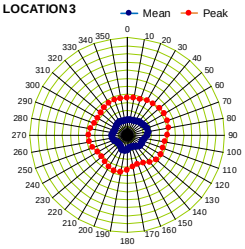
LOCATION1



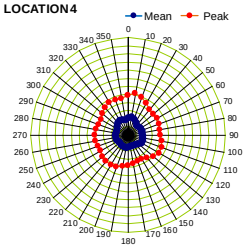
LOCATION2



LOCATION3



LOCATION4



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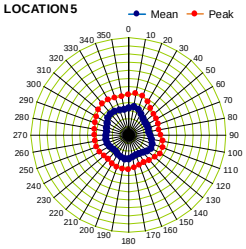

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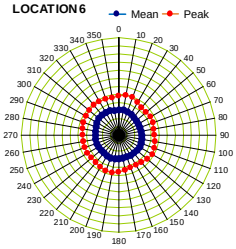

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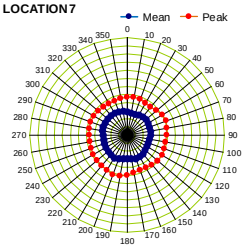

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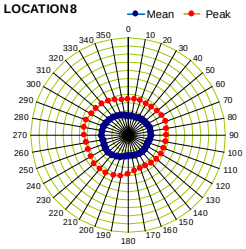

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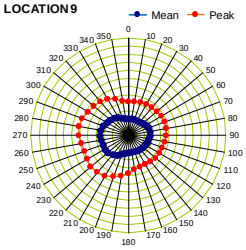

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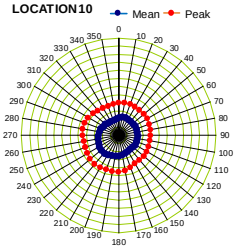

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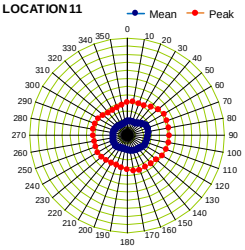

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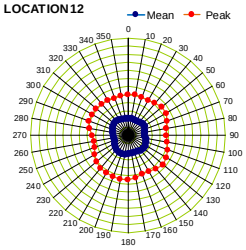

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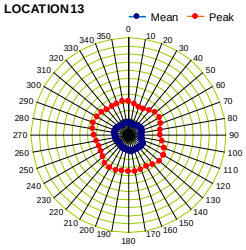

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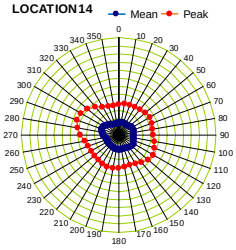

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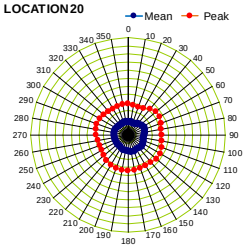

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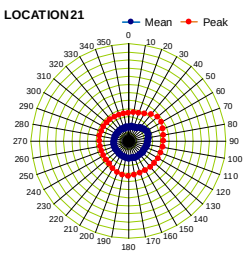

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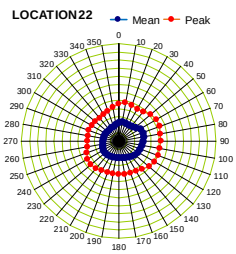

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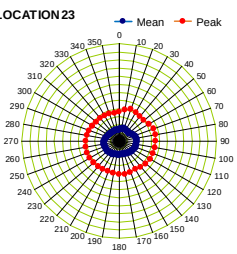

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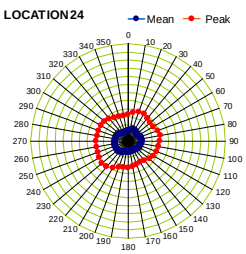

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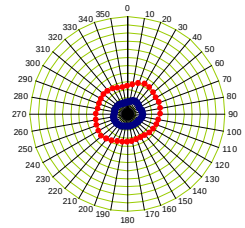

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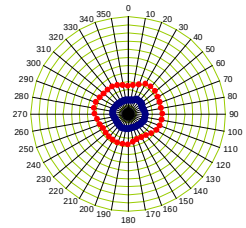

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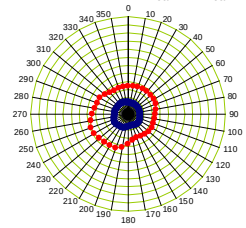

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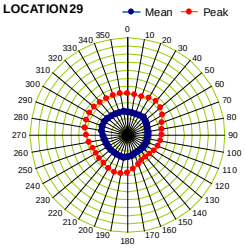

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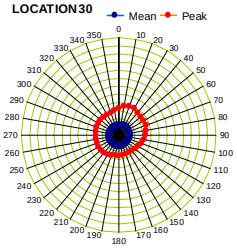

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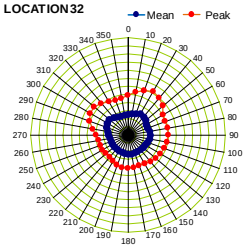

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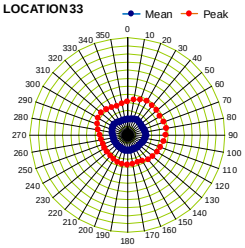

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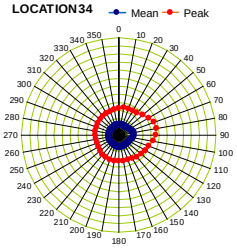

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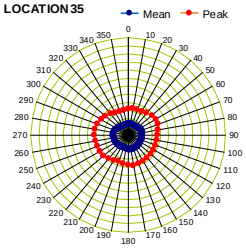

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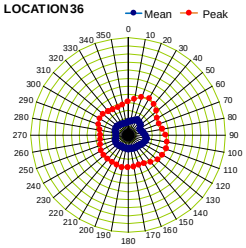

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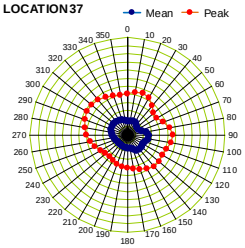

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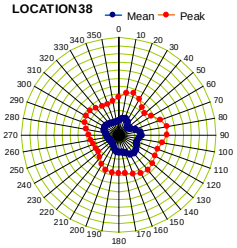

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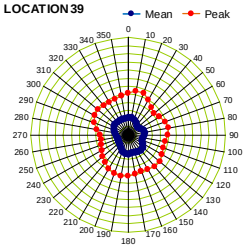

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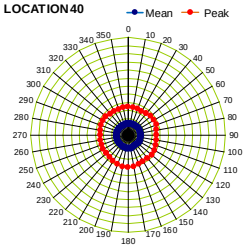

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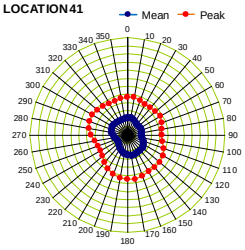

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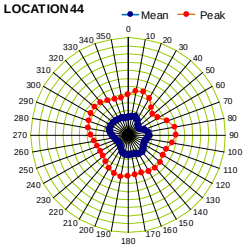

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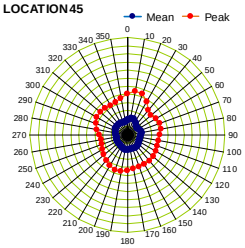

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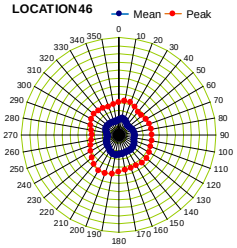

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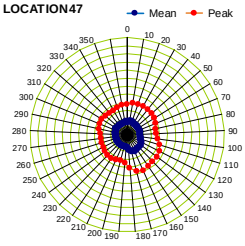

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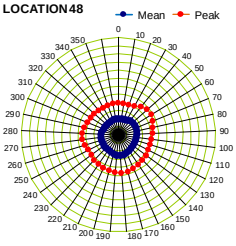

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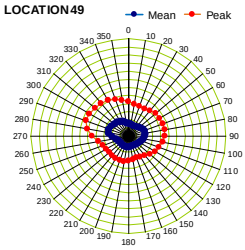

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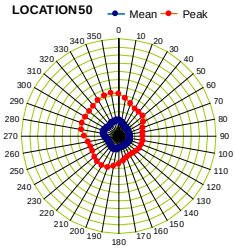

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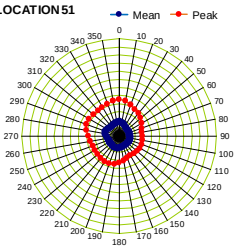

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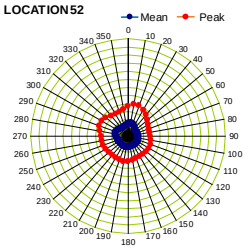

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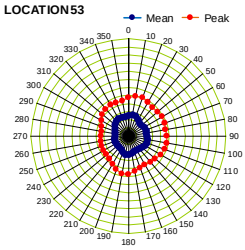

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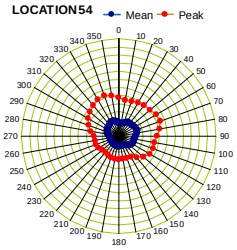

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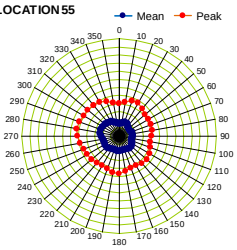

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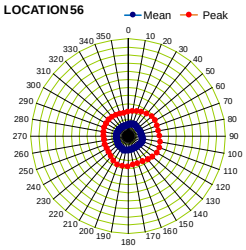

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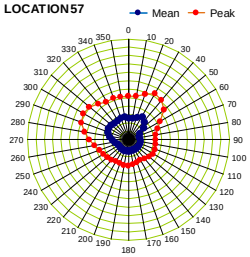

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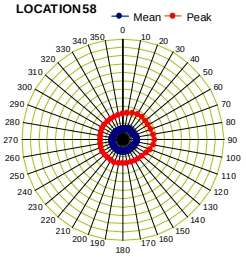

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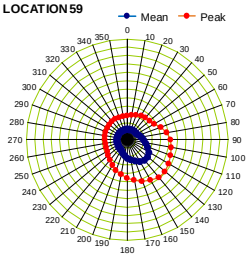

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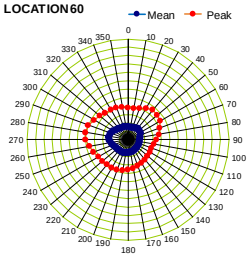

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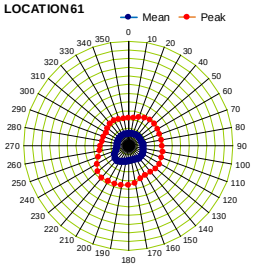

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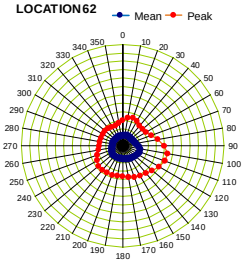

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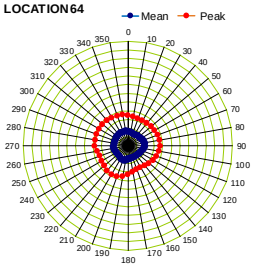

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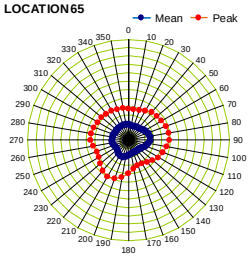

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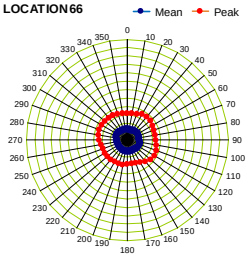

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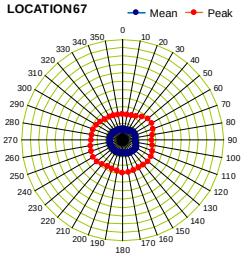

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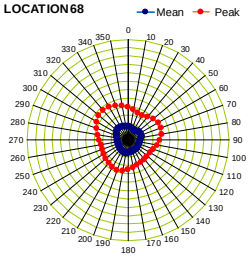

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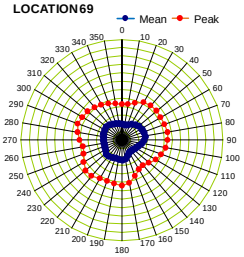

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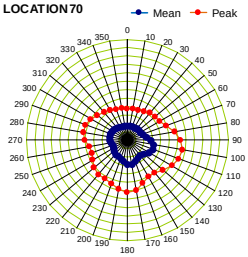

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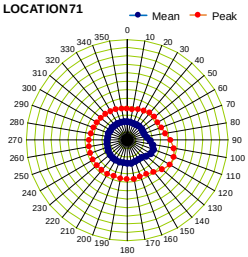

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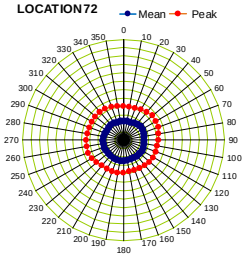

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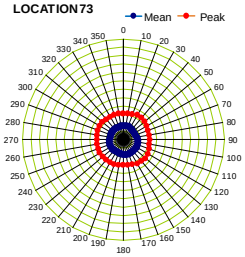
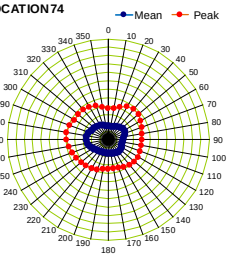


LOCATION74



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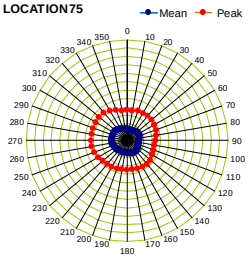

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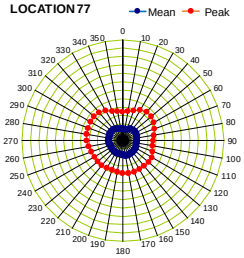

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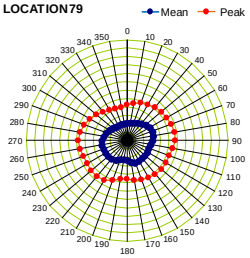

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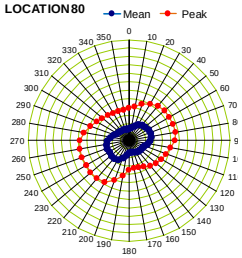

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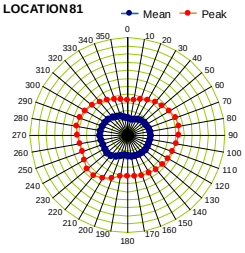

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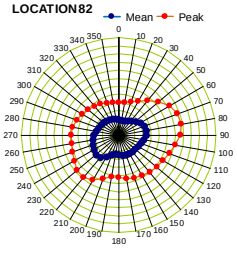

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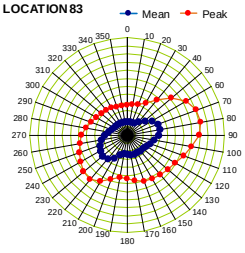

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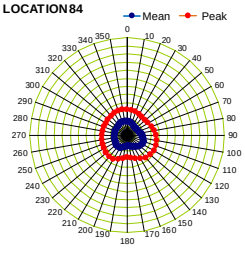

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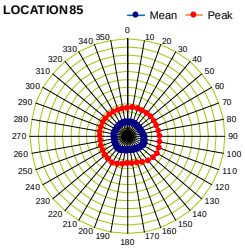

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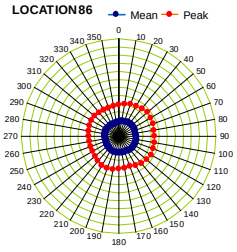

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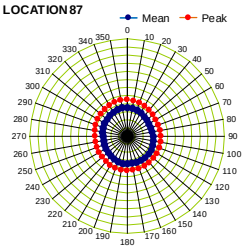

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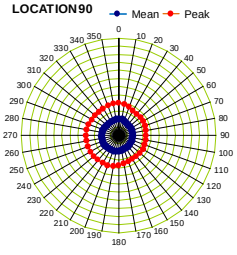
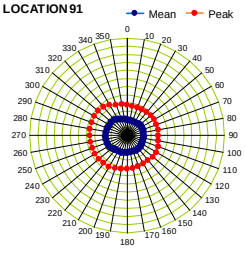
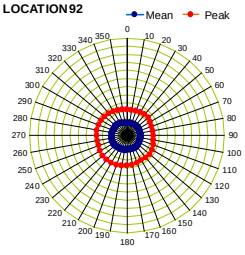


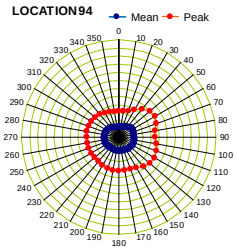
LOCATION91



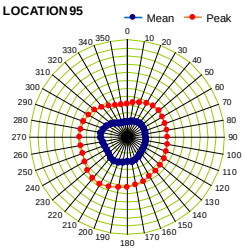
LOCATION92



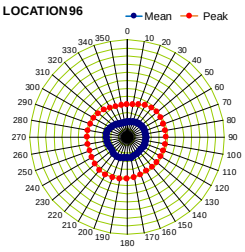
LOCATION94



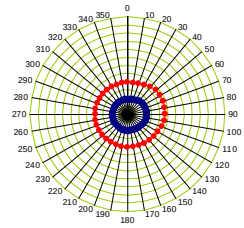
LOCATION95



LOCATION96



LOCATION97



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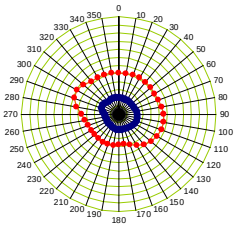
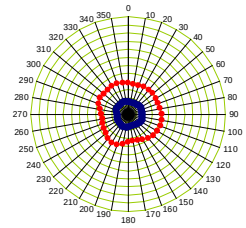
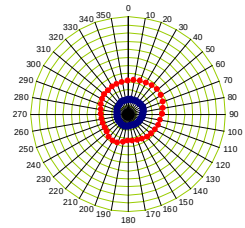


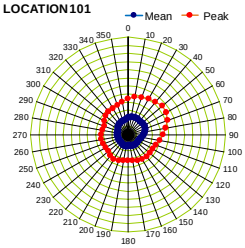
LOCATION99



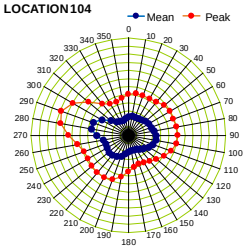
LOCATION100



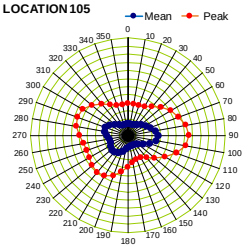
LOCATION101



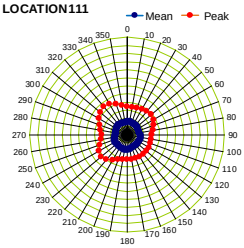
LOCATION104



LOCATION105



LOCATION111



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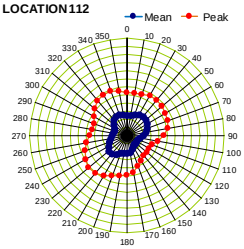

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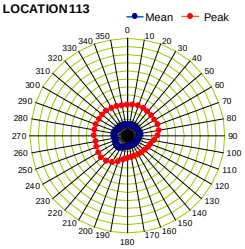

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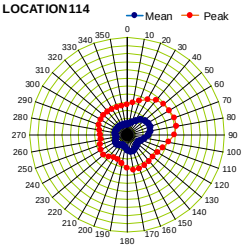

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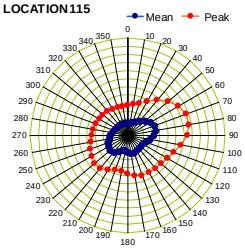
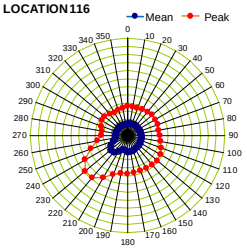


LOCATION116



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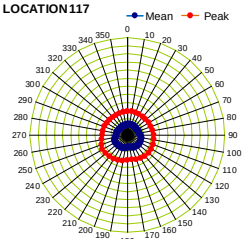
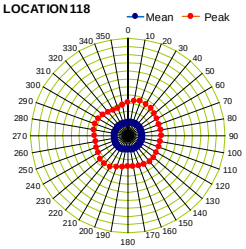
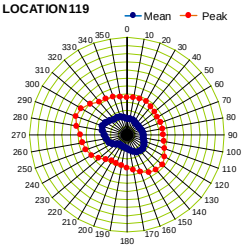


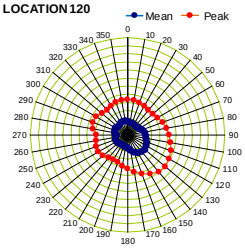
LOCATION118

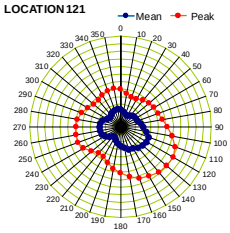


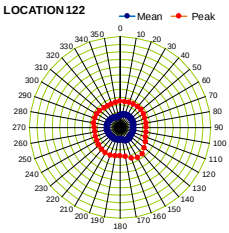
LOCATION119

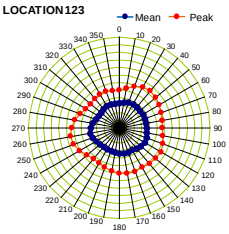


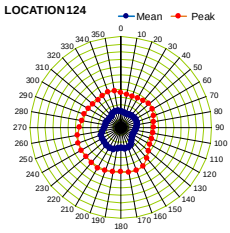
LOCATION120

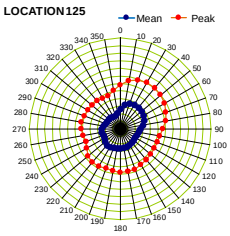



LOCATION 121
Mean
Peak


LOCATION 122
Mean
Peak


LOCATION 123
Mean
Peak


LOCATION 124
Mean
Peak


LOCATION 125
Mean
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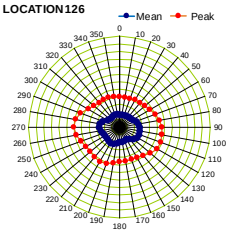
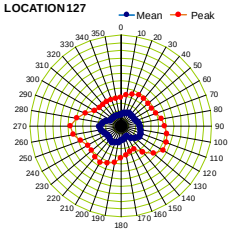
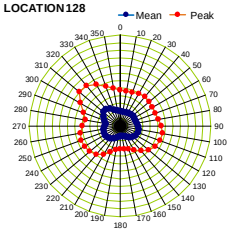
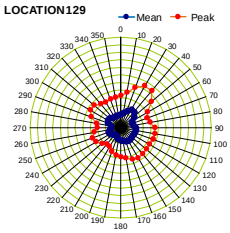
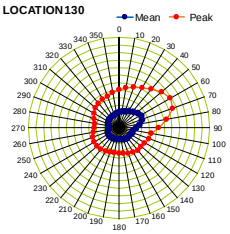
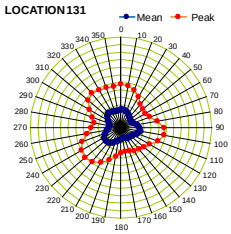

LOCATION 126
Mean
Peak

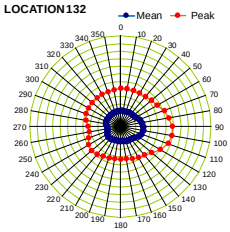

LOCATION 127
Mean
Peak

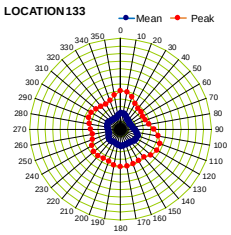

LOCATION 128
Mean
Peak

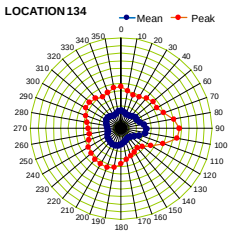

LOCATION 129
Mean
Peak

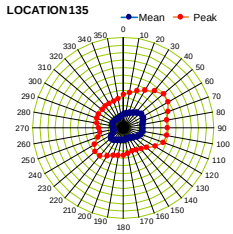

LOCATION 130
Mean
Peak

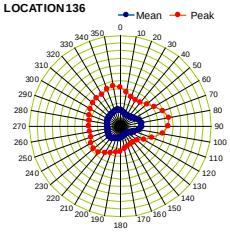

LOCATION 131
Mean
Peak

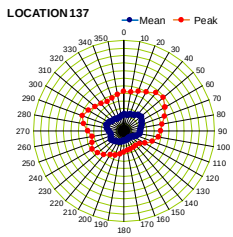

LOCATION 132
Mean
Peak

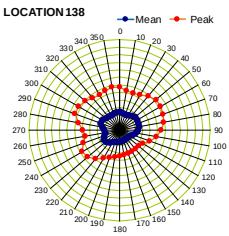

LOCATION 133
Mean
Peak

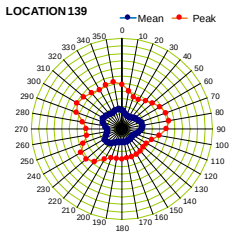

LOCATION 134
Mean
Peak

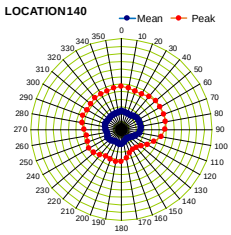

LOCATION 135
Mean
Peak


LOCATION 136
Mean
Peak


LOCATION 137
Mean
Peak


LOCATION 138
Mean
Peak

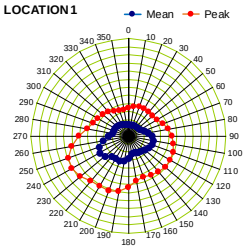

LOCATION 139
Mean
Peak


LOCATION 140
Mean
Peak

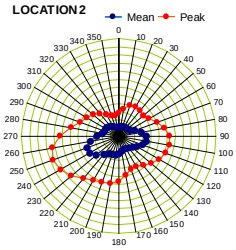
Appendix C Wind Tunnel Test Data (Polar Plots) – MASTERPLAN Scenario

The polar diagram plots show the local (ground level) mean and peak gust wind speedas a ratio of the mean reference wind speed (at a full-scale height of 200 m).The polar diagram circumferential lines representing gradations in 0.1 intervals, ie 10% ratios.

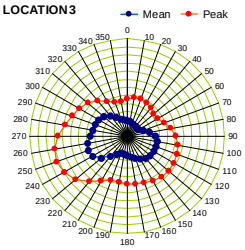
LOCATION1



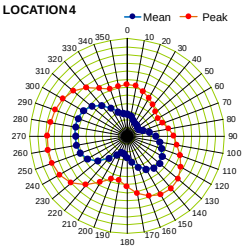
LOCATION2



LOCATION3



LOCATION4



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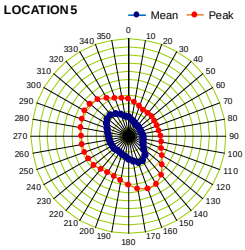

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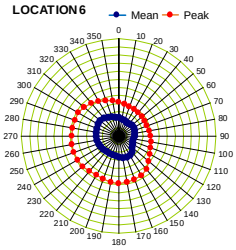

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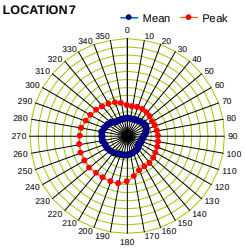

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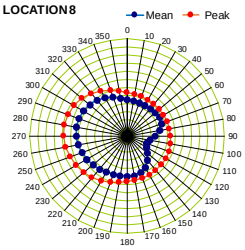

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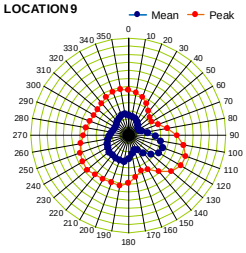

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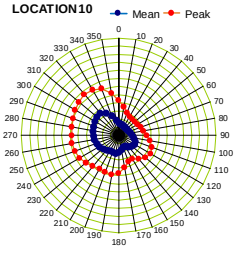

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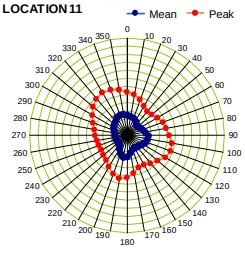

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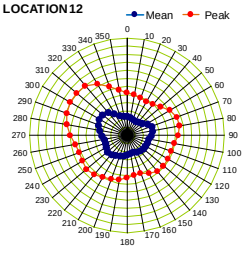

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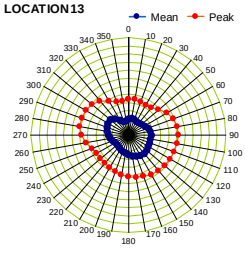

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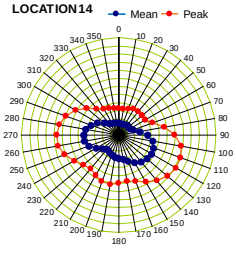

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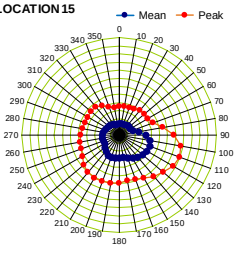

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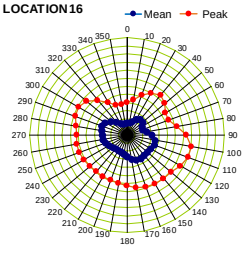

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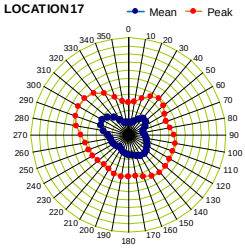

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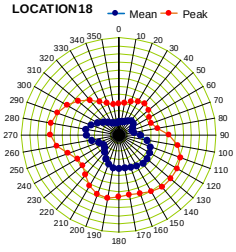

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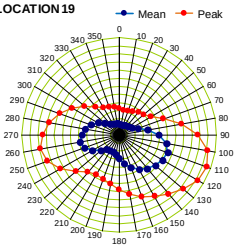

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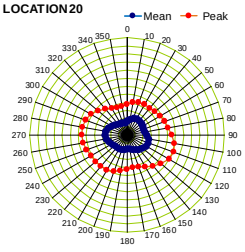

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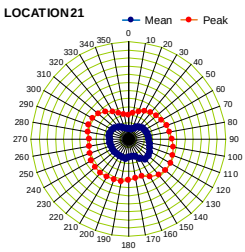

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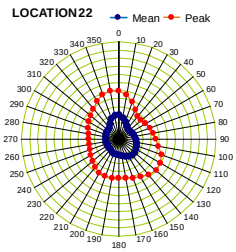

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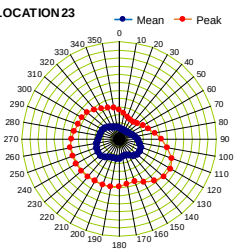

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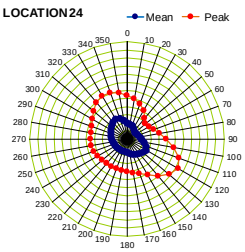

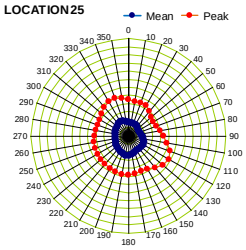
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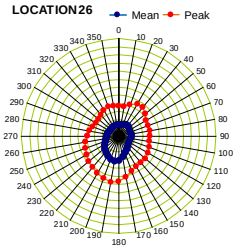
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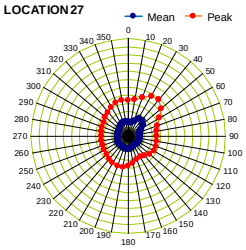
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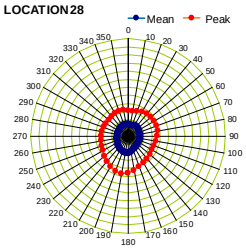
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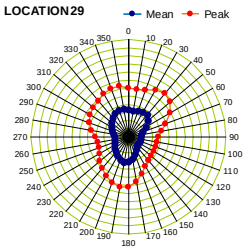
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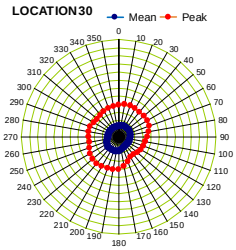
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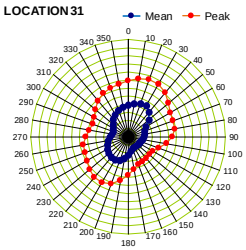
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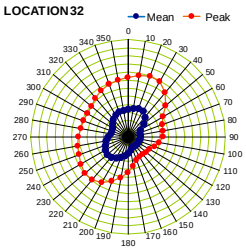
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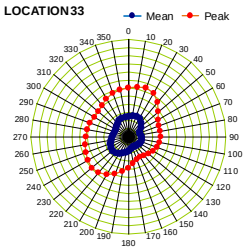
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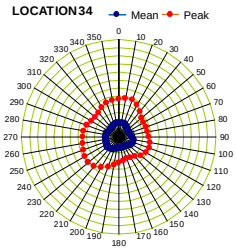
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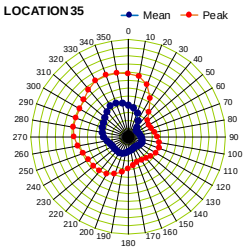
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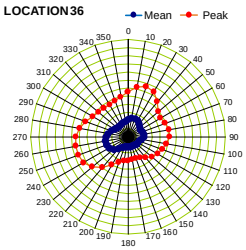
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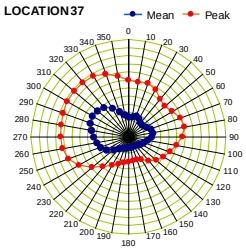
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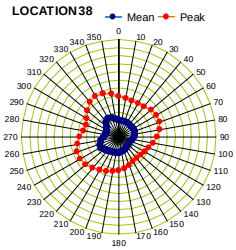
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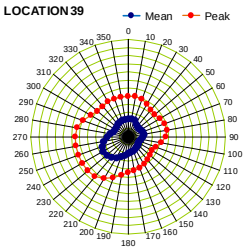
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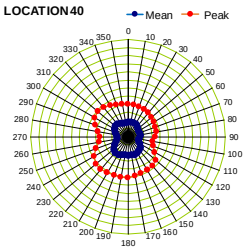
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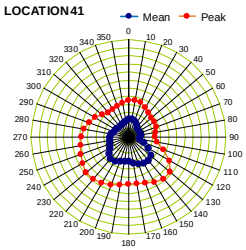
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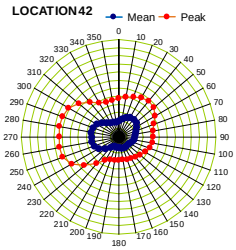
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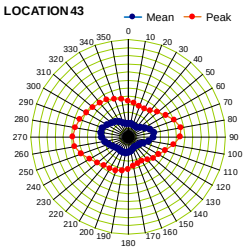
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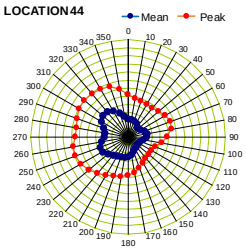
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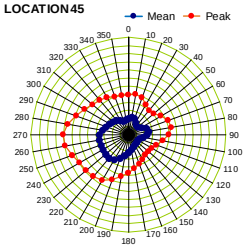
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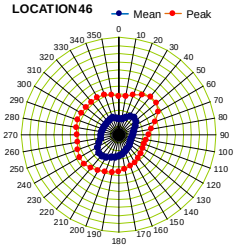
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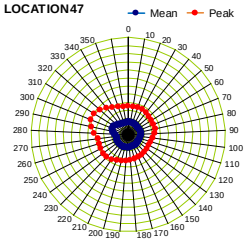
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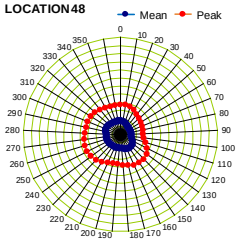
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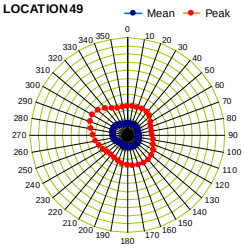
LOCATION49



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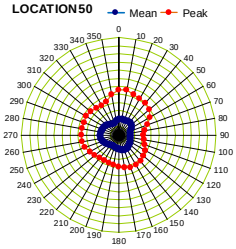

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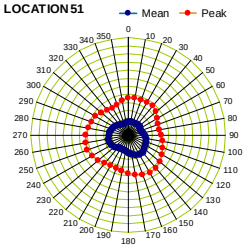

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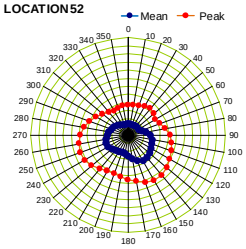

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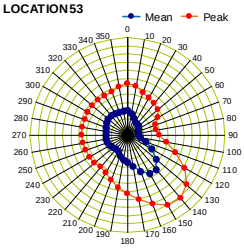

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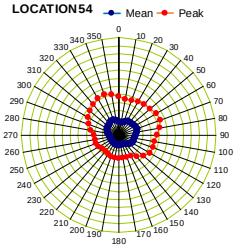

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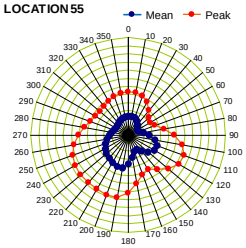

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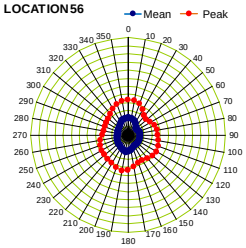

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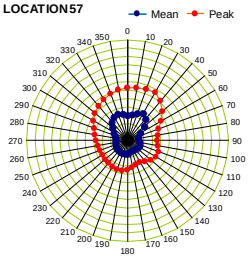

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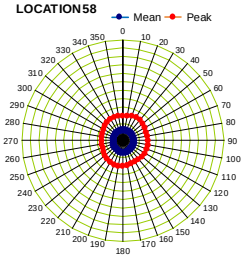

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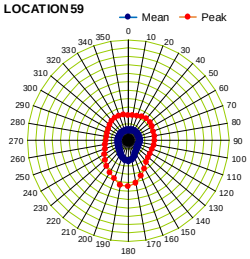

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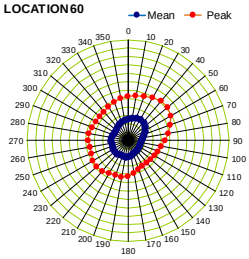

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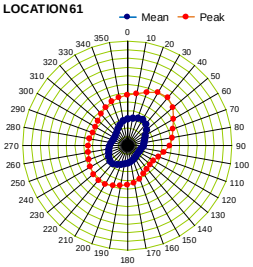
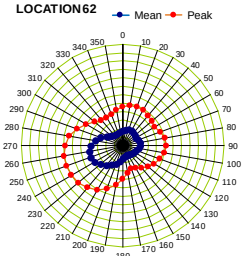
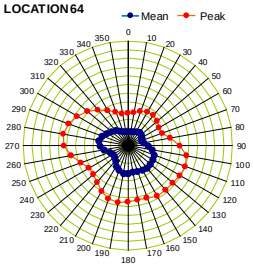


LOCATION62



LOCATION64



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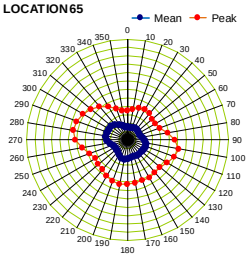

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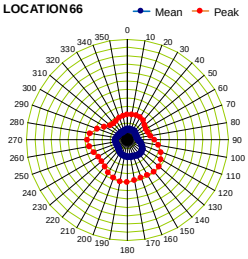

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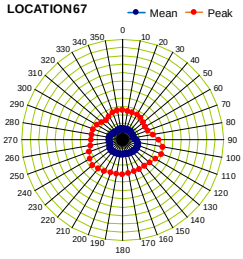

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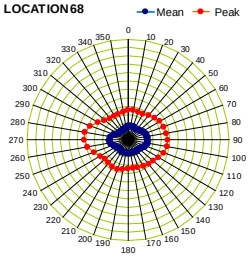

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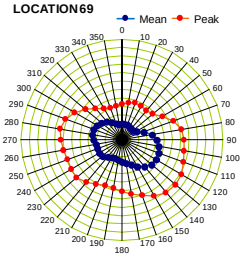

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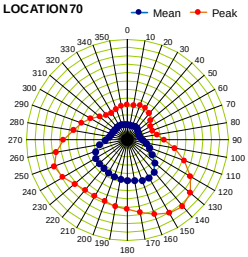

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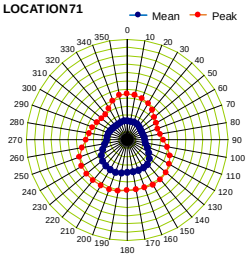

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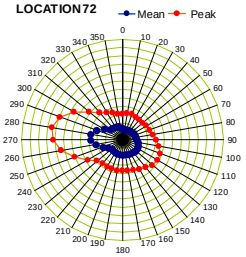

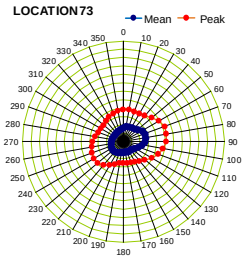
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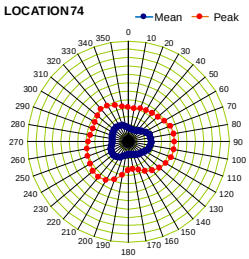
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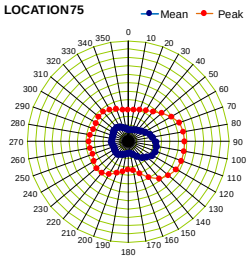
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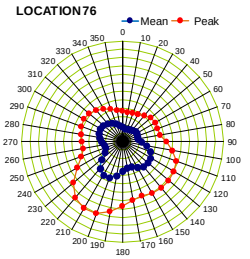
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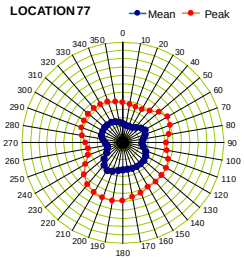
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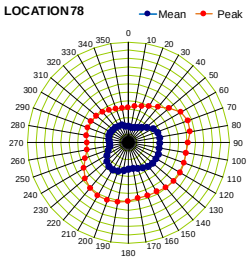
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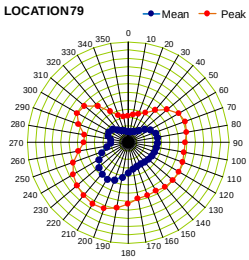
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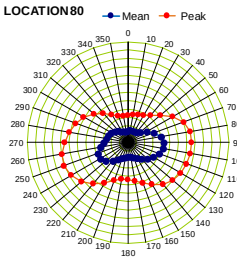
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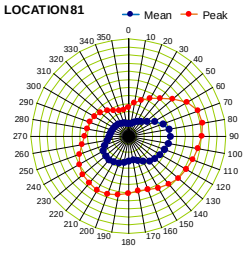
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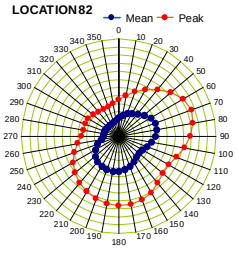
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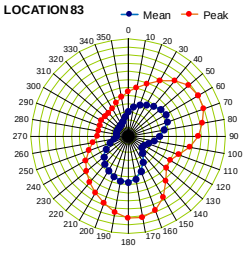
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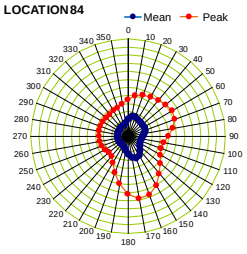
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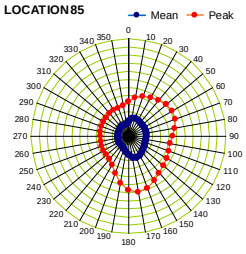
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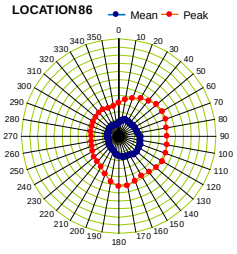
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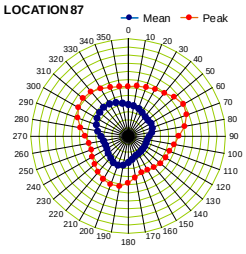
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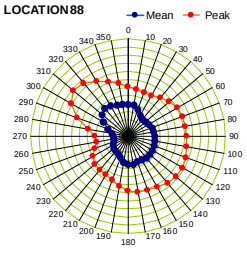
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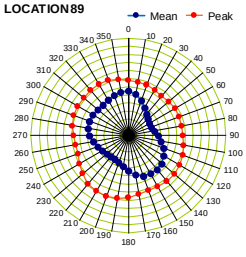
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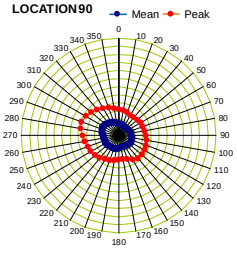
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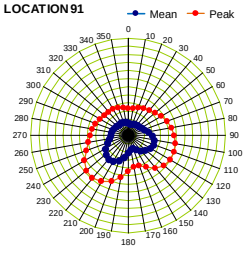
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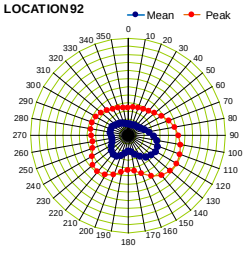
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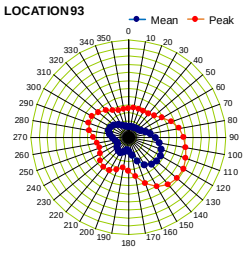
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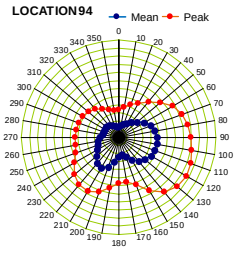
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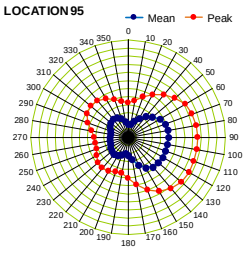
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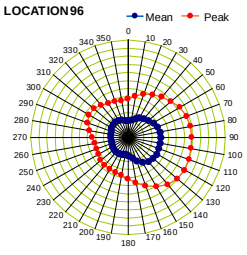
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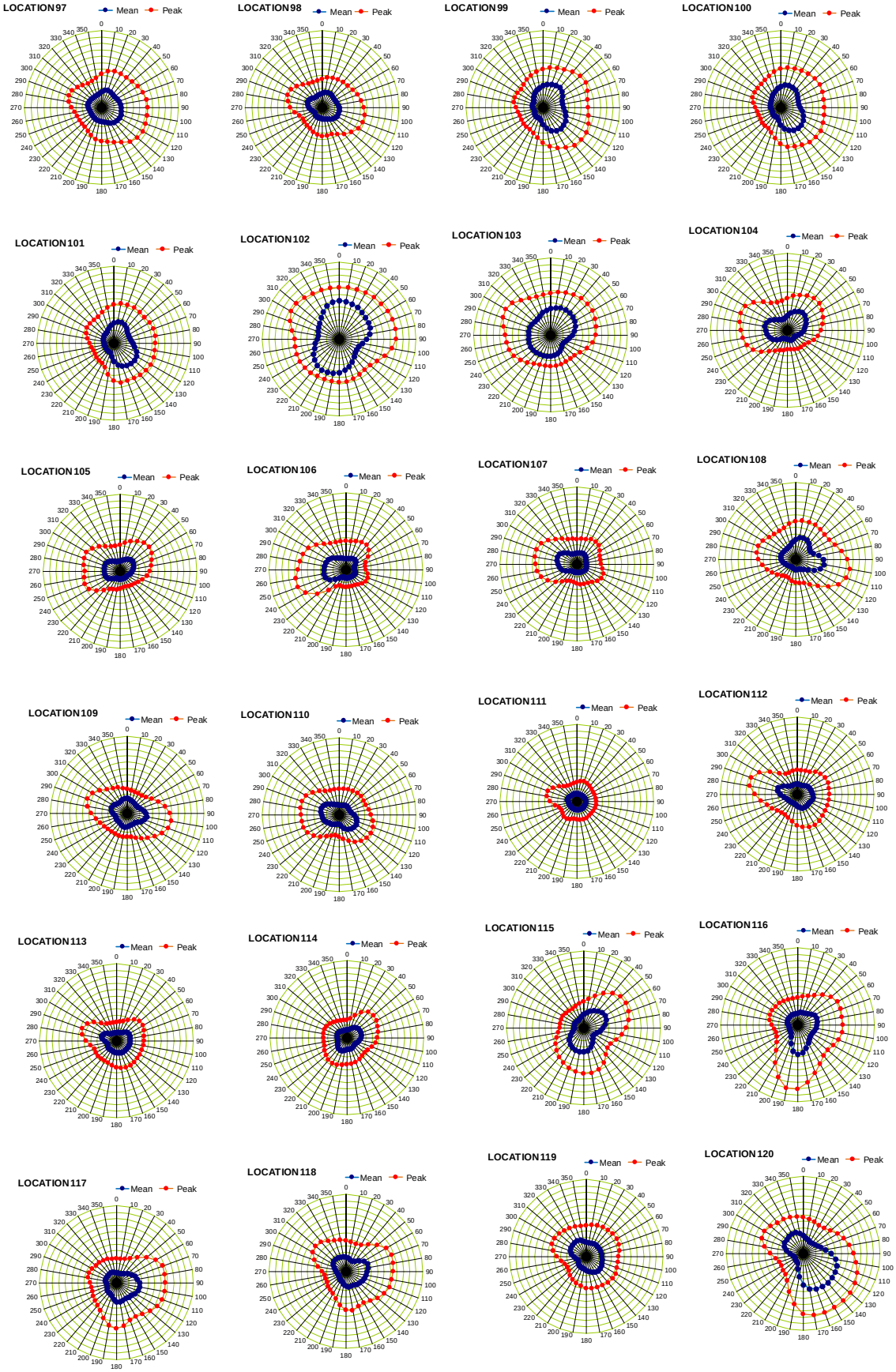
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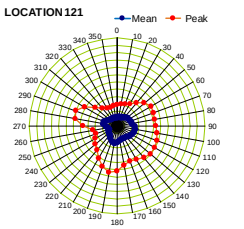
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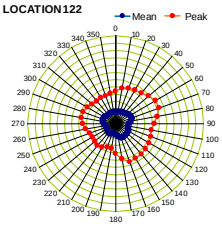
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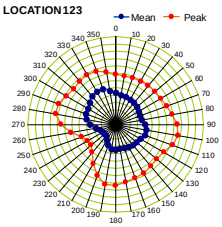
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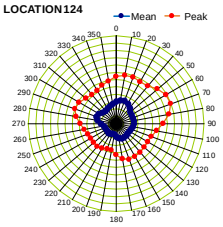
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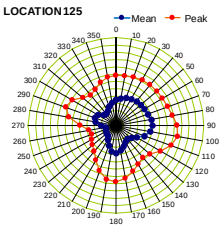
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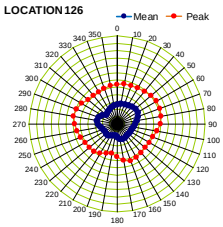
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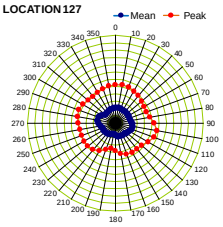
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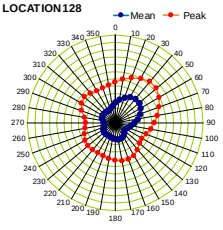
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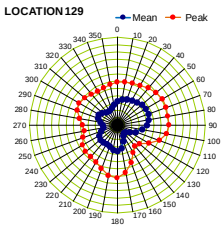
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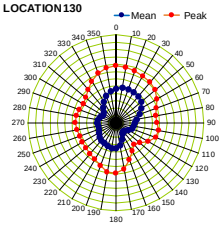
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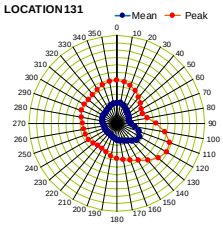
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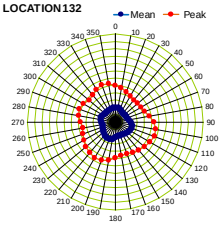
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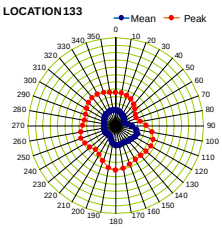
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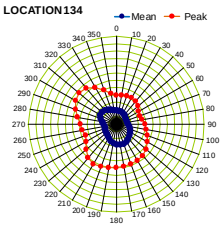
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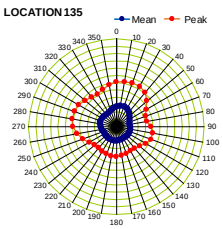
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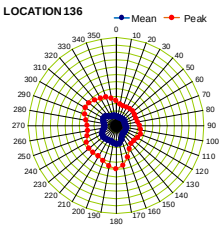
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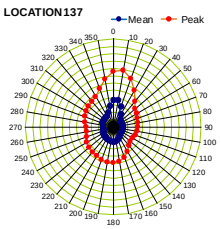
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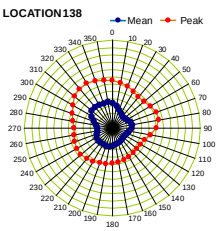
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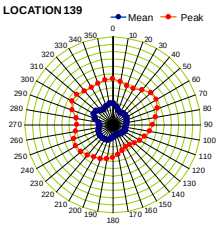
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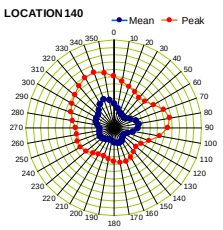
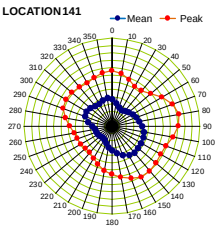
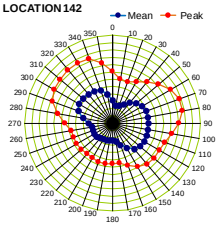
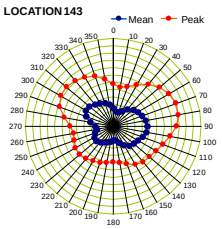
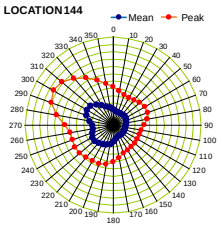
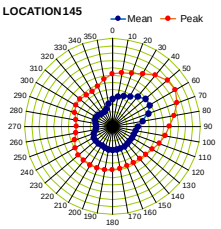

LOCATION 140
Mean
Peak

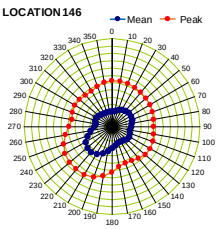

LOCATION 141
Mean
Peak


LOCATION 142
Mean
Peak


LOCATION 143
Mean
Peak


LOCATION 144
Mean
Peak

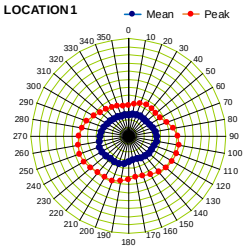

LOCATION 145
Mean
Peak


LOCATION 146
Mean
Peak

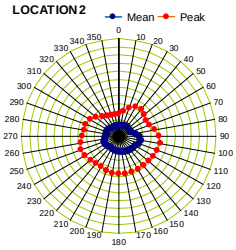
Appendix D Wind Tunnel Test Data (Polar Plots) – MASTERPLAN WITH MITIGATION Scenario

The polar diagram plots show the local (ground level) mean and peak gust wind speed as a ratio of the mean reference wind speed (at a full-scale height of 200 m).The polar diagram circumferential lines representing gradations in 0.1 intervals, ie 10% ratios.

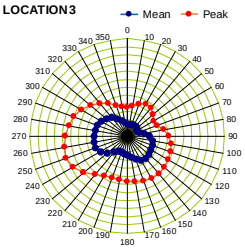
LOCATION1



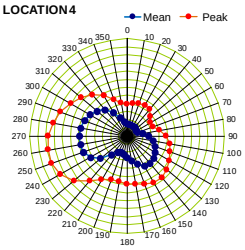
LOCATION2



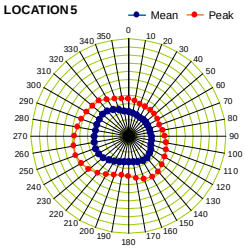
LOCATION3



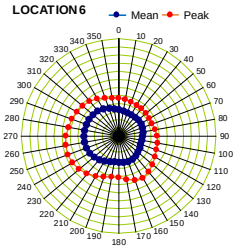
LOCATION4



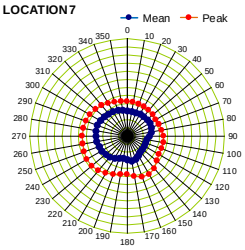
LOCATION5



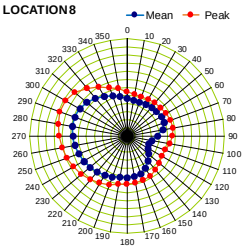
LOCATION6



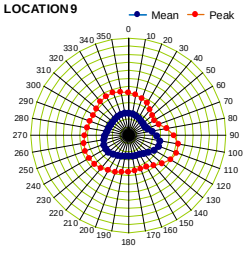
LOCATION7



LOCATION8



LOCATION9



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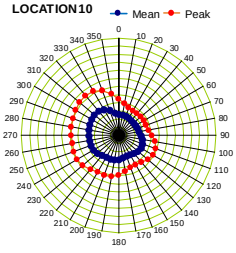

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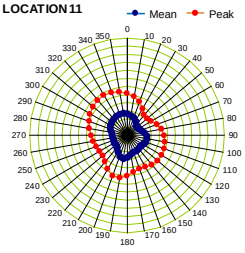
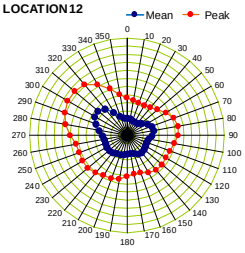
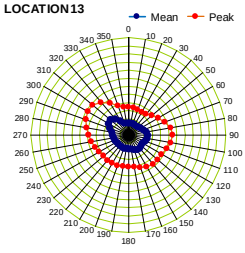


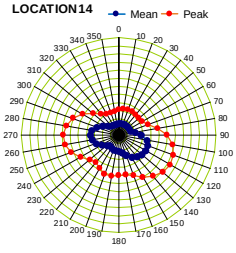
LOCATION12



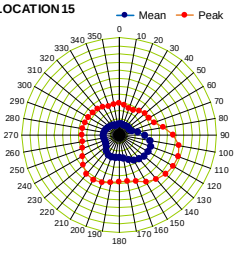
LOCATION13



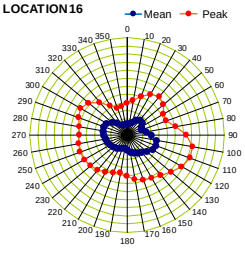
LOCATION14



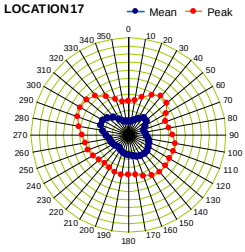
LOCATION15



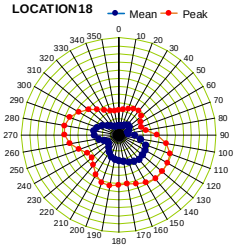
LOCATION16



LOCATION17



LOCATION18



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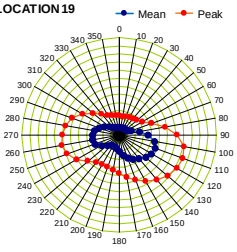
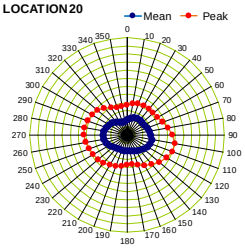


LOCATION20



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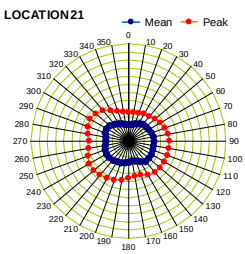

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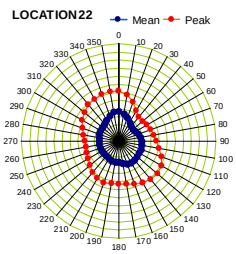

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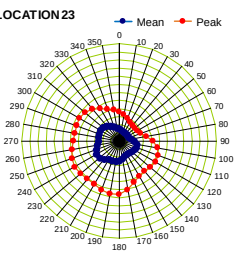

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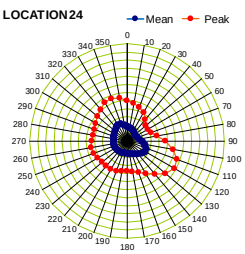

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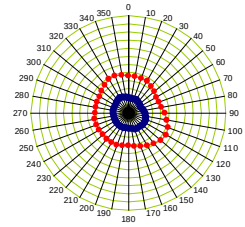
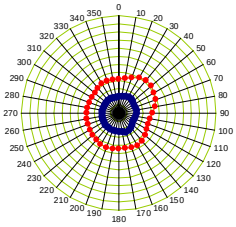


LOCATION26



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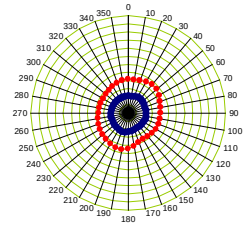
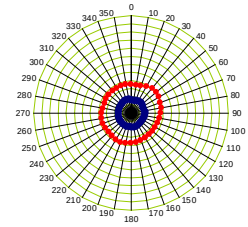


LOCATION28



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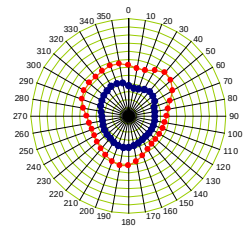

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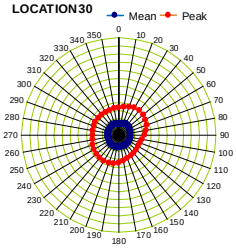
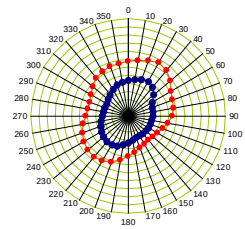
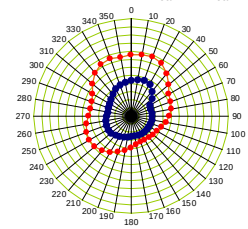


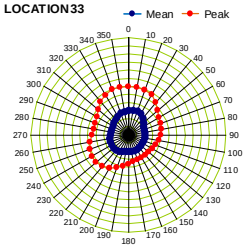
LOCATION31



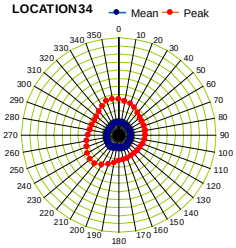
LOCATION32



LOCATION33



LOCATION34



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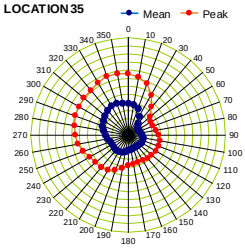
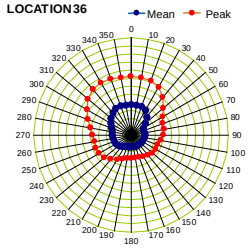
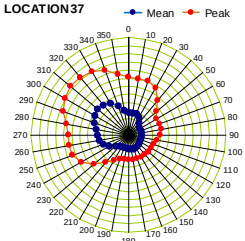


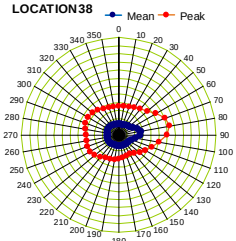
LOCATION36



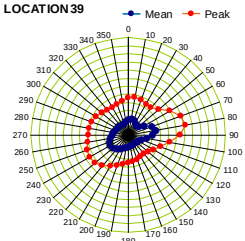
LOCATION37



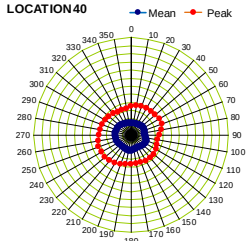
LOCATION38



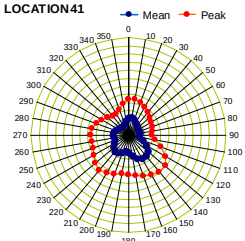
LOCATION39



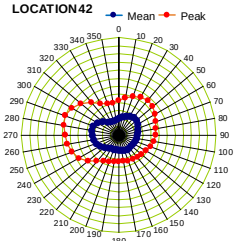
LOCATION40



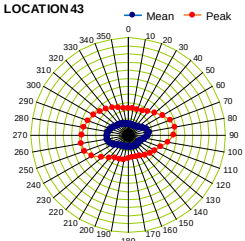
LOCATION41



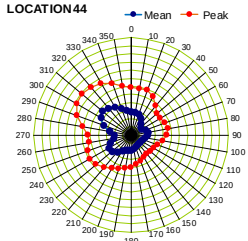
LOCATION42



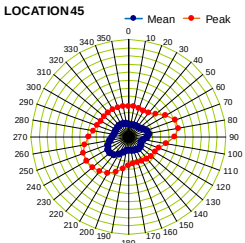
LOCATION43



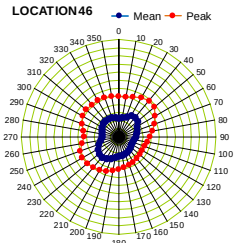
LOCATION44



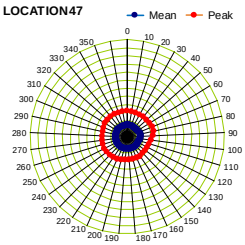
LOCATION45



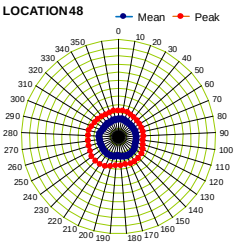
LOCATION46



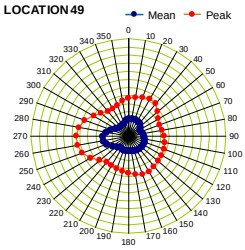
LOCATION47



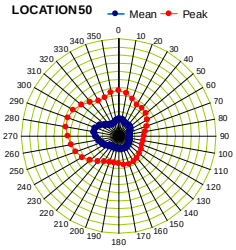
LOCATION48



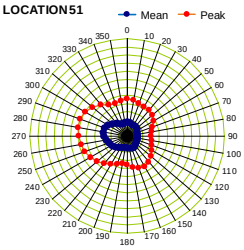
LOCATION49



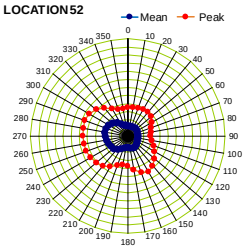
LOCATION50



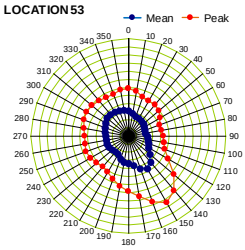
LOCATION51



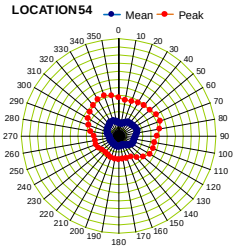
LOCATION52



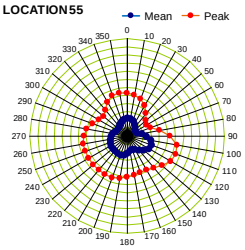
LOCATION53



LOCATION54



LOCATION55



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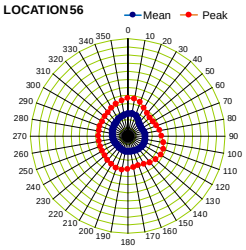

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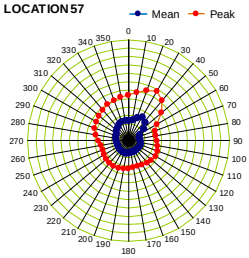

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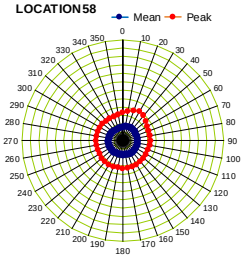

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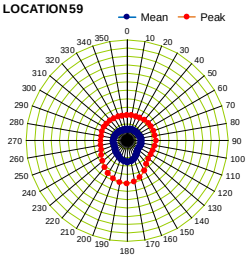

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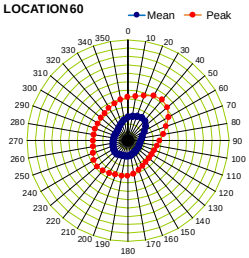

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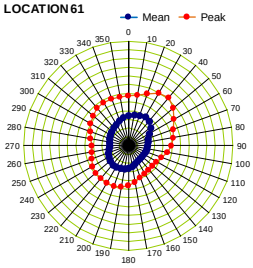

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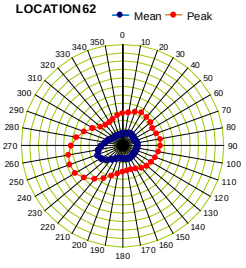

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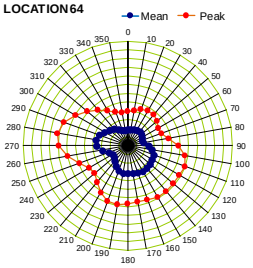

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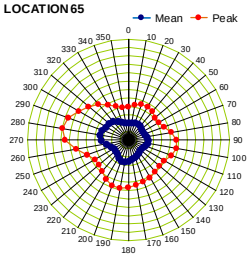

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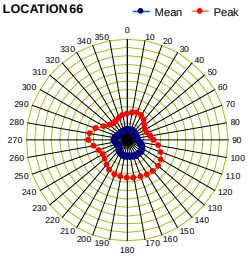

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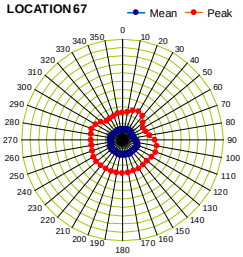

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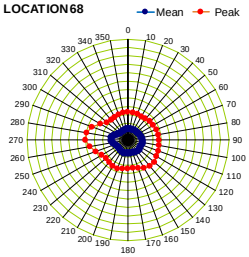

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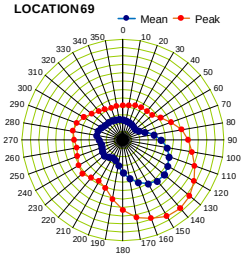

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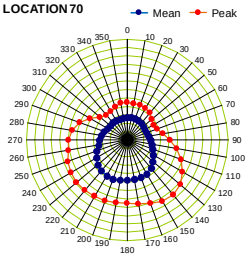

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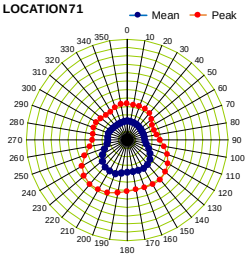

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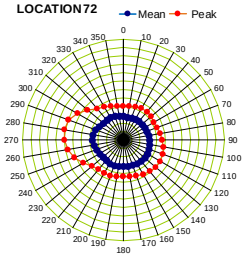

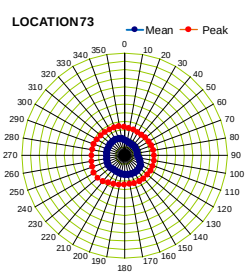
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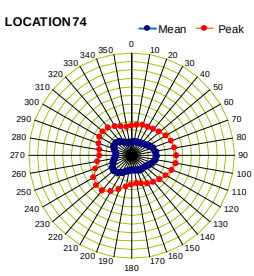
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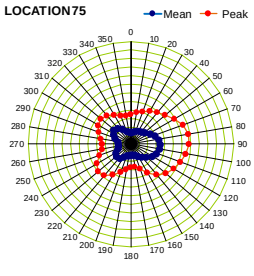
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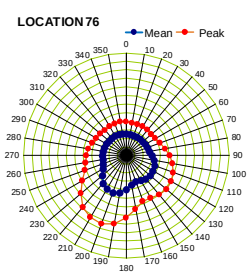
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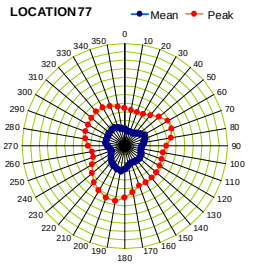
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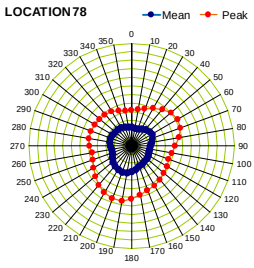
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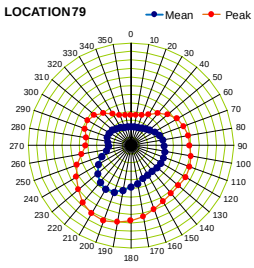
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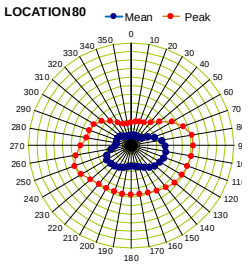
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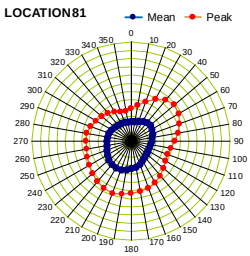
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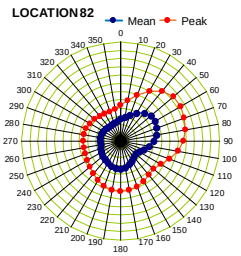
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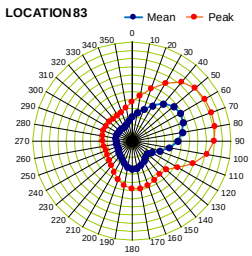
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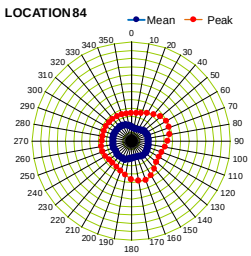
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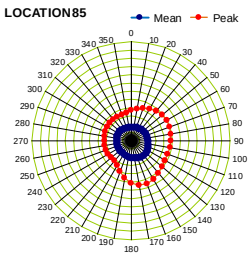
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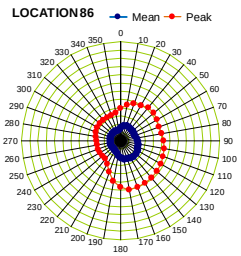
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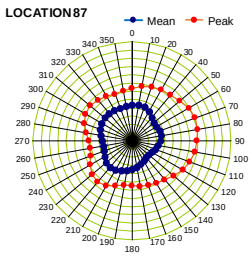
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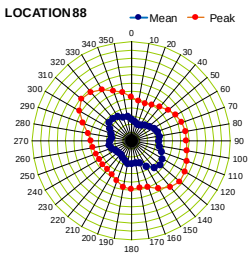
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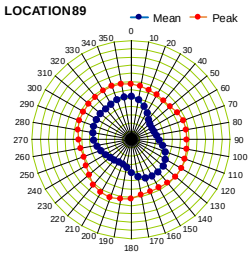
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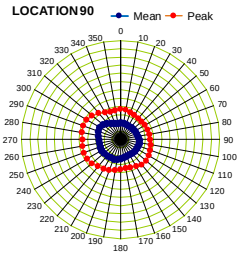
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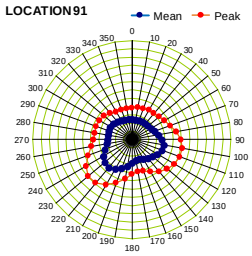
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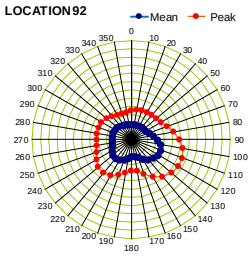
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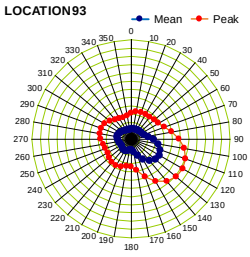
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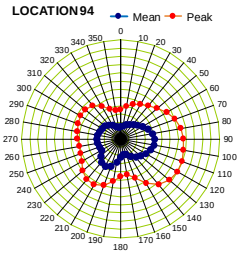
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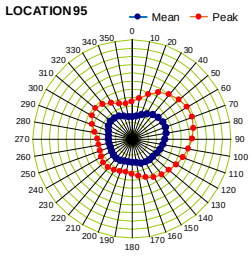
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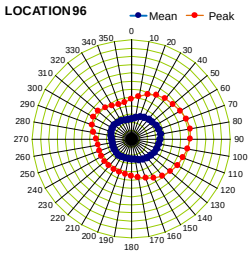
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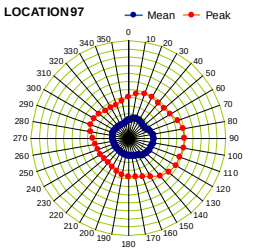
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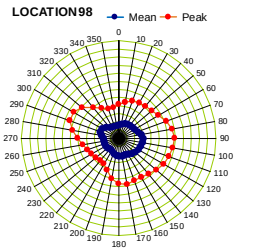
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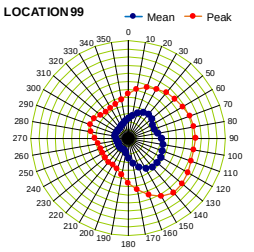
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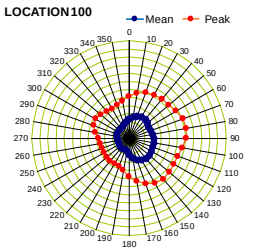
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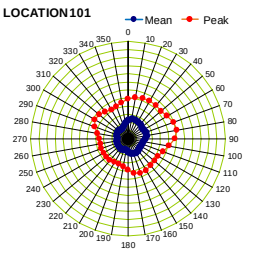
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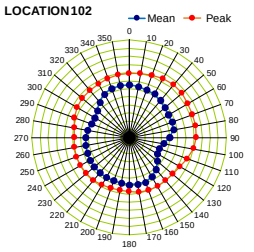
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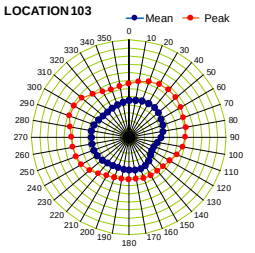
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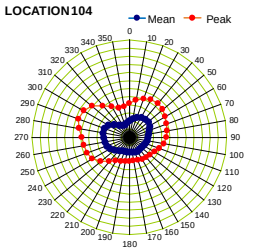
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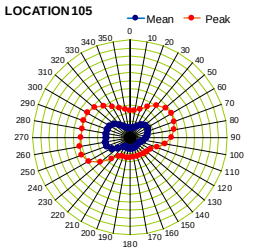
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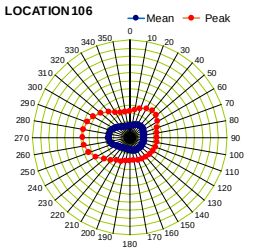
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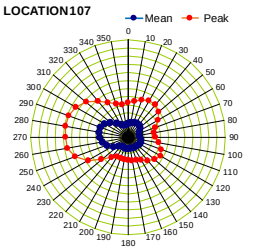
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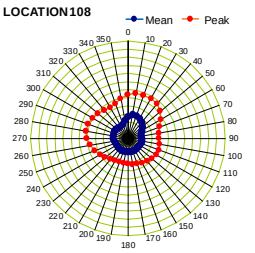
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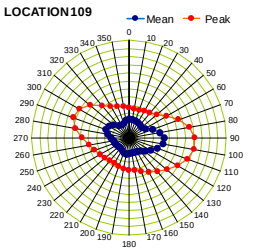
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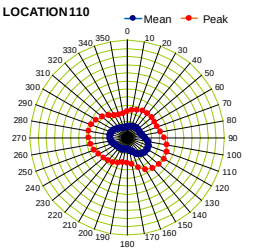
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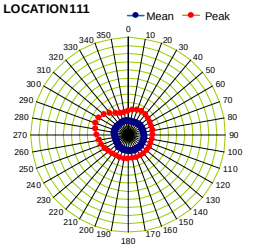
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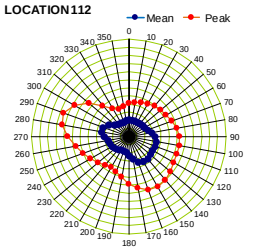
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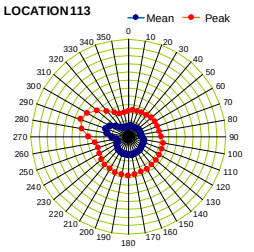
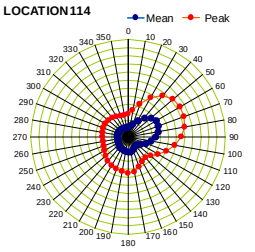
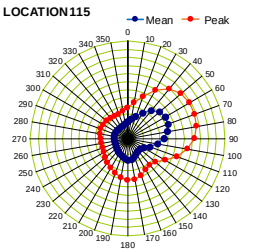
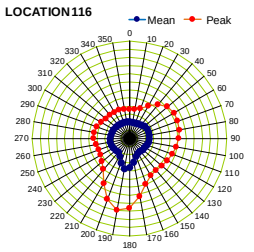
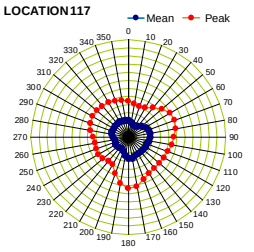
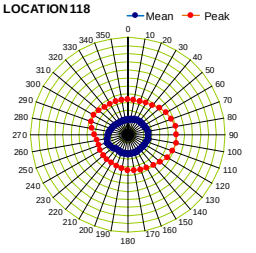

LOCATION113
Mean
Peak

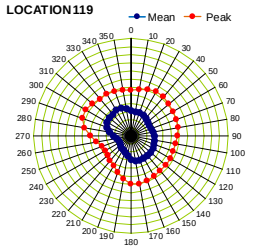

LOCATION114
Mean
Peak

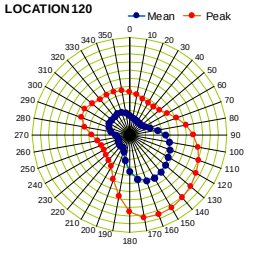

LOCATION115
Mean
Peak

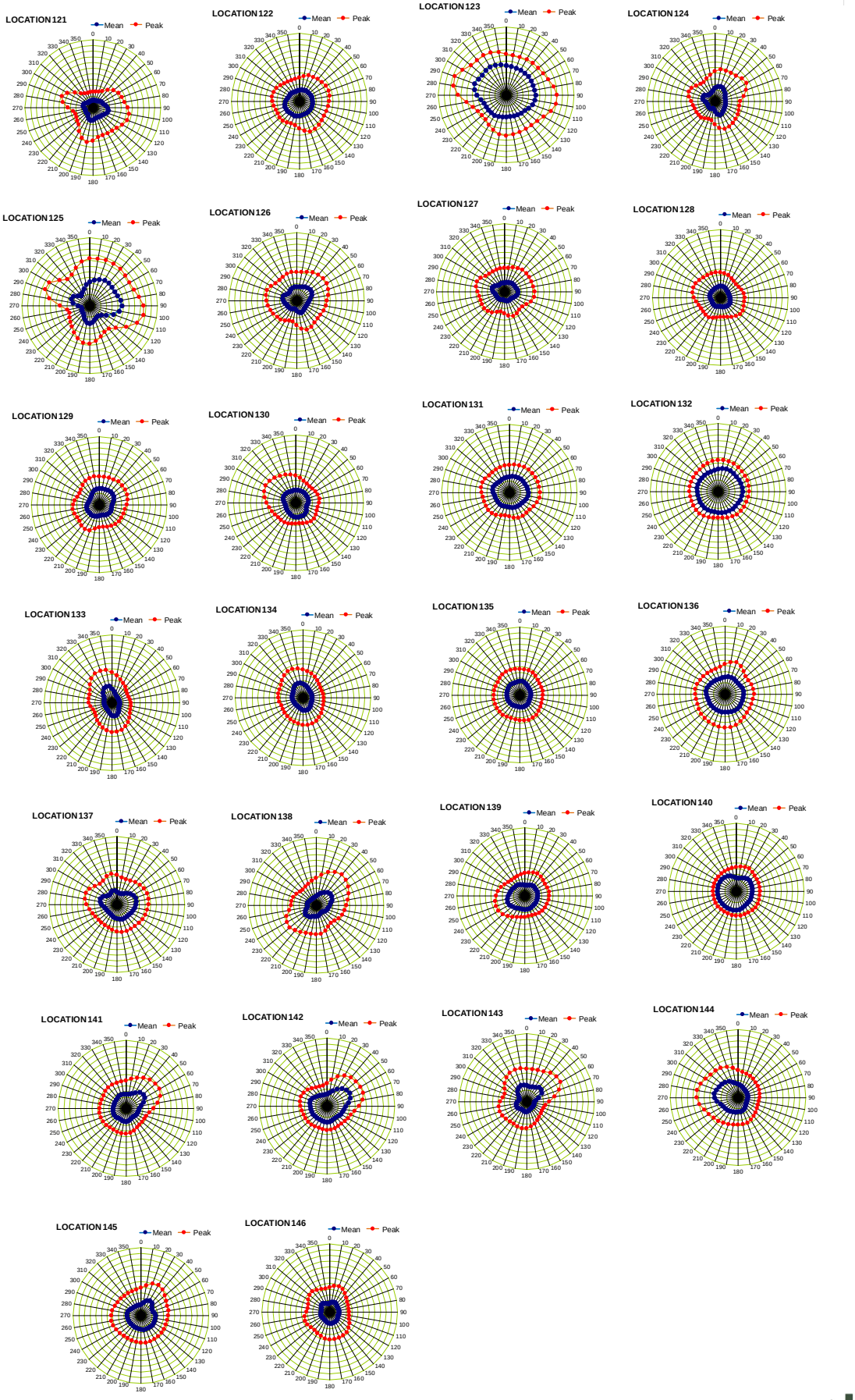

LOCATION116
Mean
Peak


LOCATION117
Mean
Peak


LOCATION118
Mean
Peak

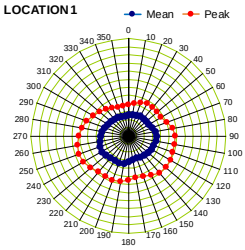

LOCATION119
Mean
Peak

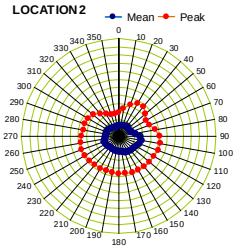

LOCATION120
Mean
Peak

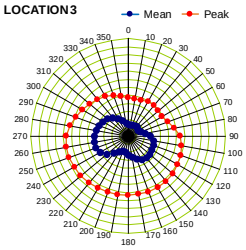

LOCATION 121
LOCATION 122
LOCATION 123
LOCATION 124
LOCATION 125
LOCATION 126
LOCATION 127
LOCATION 128
LOCATION 129
LOCATION 130
LOCATION 131
LOCATION 132
LOCATION 133
LOCATION 134
LOCATION 135
LOCATION 136
LOCATION 137
LOCATION 138
LOCATION 139
LOCATION 140
LOCATION 141
LOCATION 142
LOCATION 143
LOCATION 144
LOCATION 145
LOCATION 146
Mean
Peak

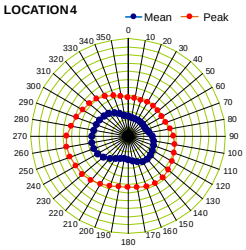
Appendix E Wind Tunnel Test Data (Polar Plots) – MASTERPLAN WITH FUTURE Scenario

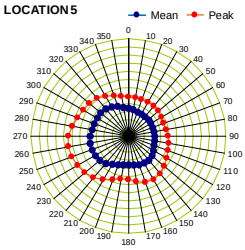
The polar diagram plots show the local (ground level) mean and peak gust wind speed as a ratio of the mean reference wind speed (at a full-scale height of 200 m).The polar diagram circumferential lines representing gradations in 0.1 intervals, ie 10% ratios.

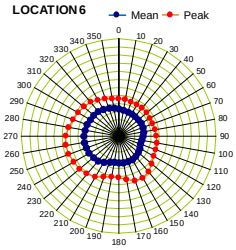

LOCATION1
Mean
Peak

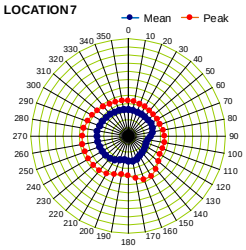

LOCATION2
Mean
Peak

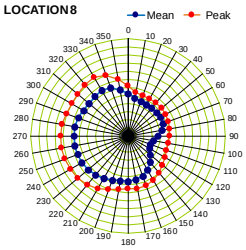

LOCATION3
Mean
Peak

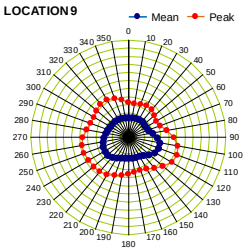

LOCATION4
Mean
Peak

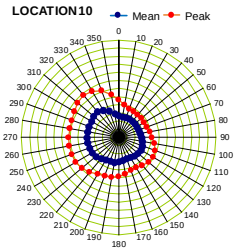

LOCATION5
Mean
Peak

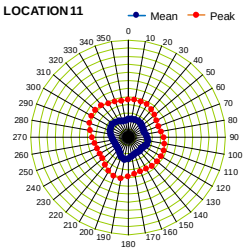

LOCATION6
Mean
Peak

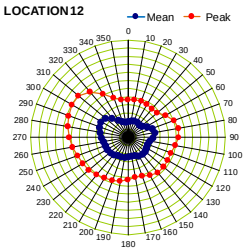

LOCATION7
Mean
Peak

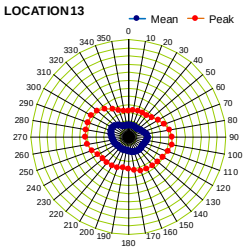

LOCATION8
Mean
Peak

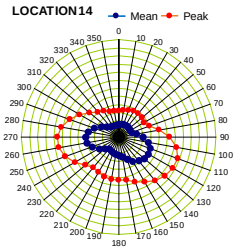

LOCATION9
Mean
Peak

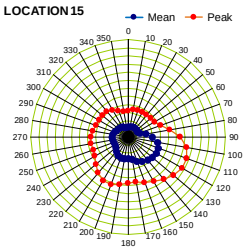

LOCATION10
Mean
Peak

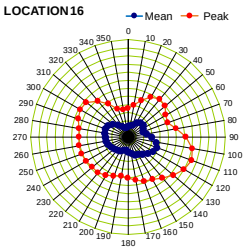

LOCATION11
Mean
Peak

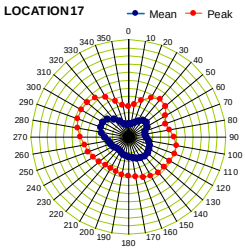

LOCATION12
Mean
Peak

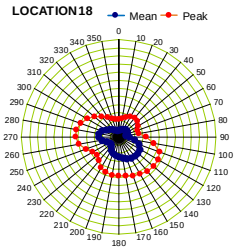

LOCATION13
Mean
Peak


LOCATION14
Mean
Peak


LOCATION15
Mean
Peak


LOCATION16
Mean
Peak


LOCATION17
Mean
Peak


LOCATION18
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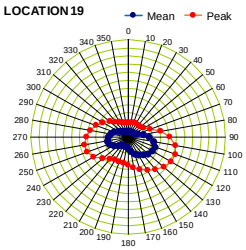
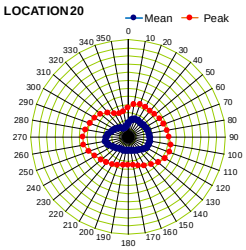

LOCATION19
Mean
Peak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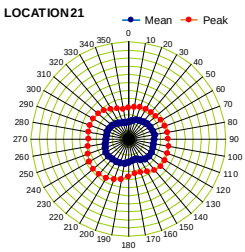
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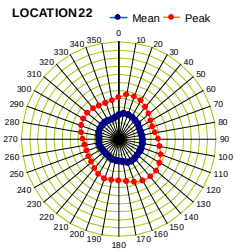
LOCATION22
Mean
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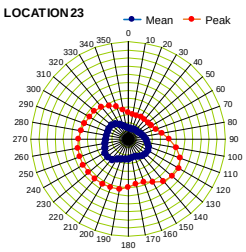
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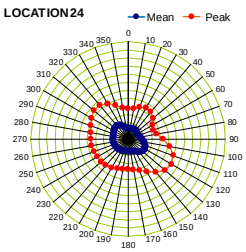
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Mean
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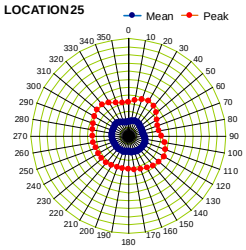
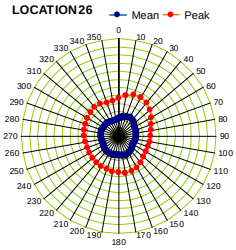

LOCATION25
Mean
Peak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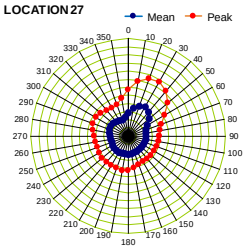
Peak


LOCATION27
Mean
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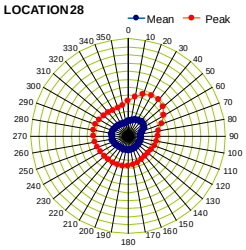
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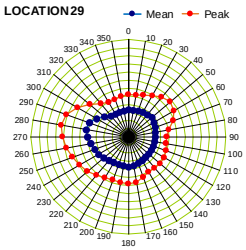
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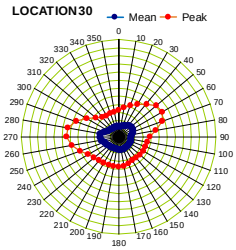
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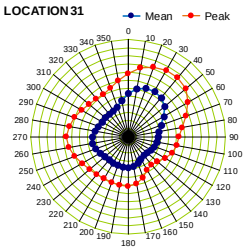
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Mean
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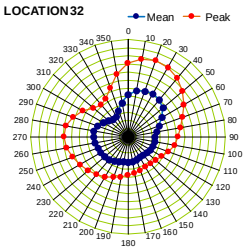
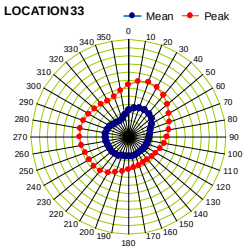
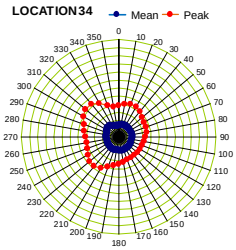

LOCATION32
Mean
Peak


LOCATION33
Mean
Peak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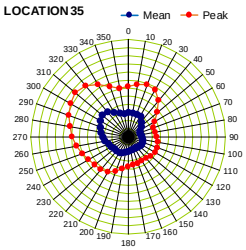
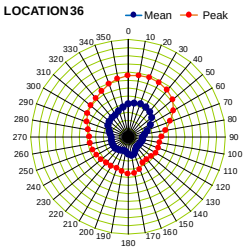
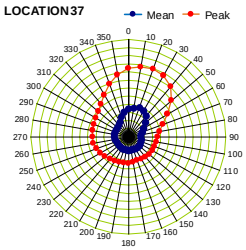
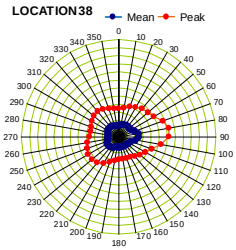
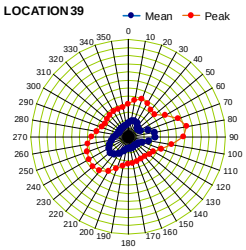
Mean
Peak

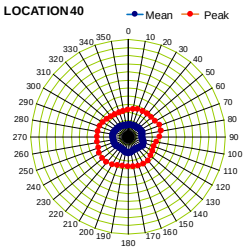

LOCATION35
Mean
Peak

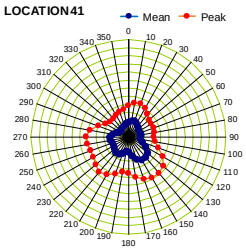

LOCATION36
Mean
Peak

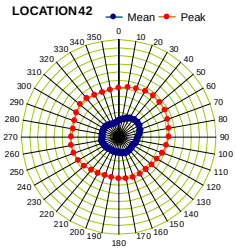

LOCATION37
Mean
Peak

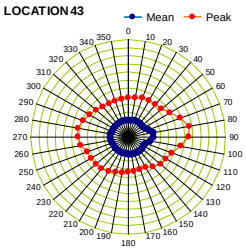

LOCATION38
Mean
Peak

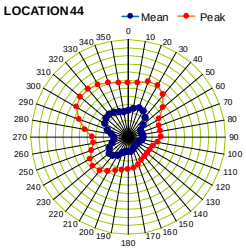

LOCATION39
Mean
Peak

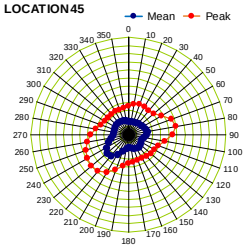

LOCATION40
Mean
Peak

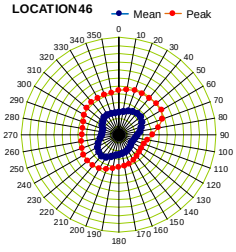

LOCATION41
Mean
Peak

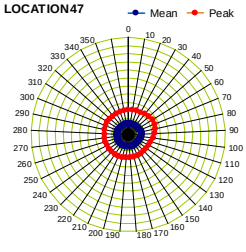

LOCATION42
Mean
Peak

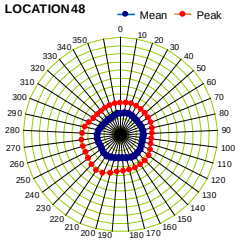

LOCATION43
Mean
Peak


LOCATION44
Mean
Peak

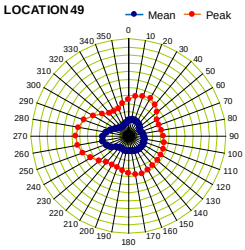

LOCATION45
Mean
Peak


LOCATION46
Mean
Peak

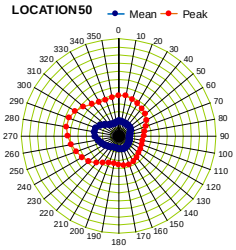

LOCATION47
Mean
Peak


LOCATION48
Mean
Peak

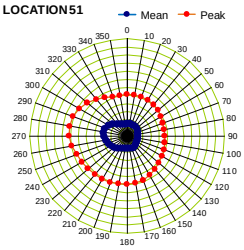
LOCATION49



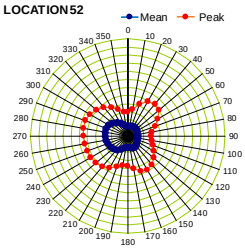
LOCATION50



LOCATION51



LOCATION52



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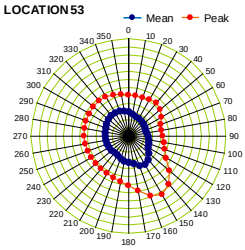
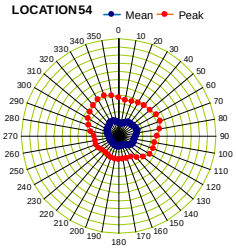
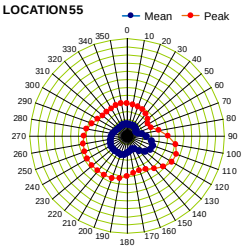


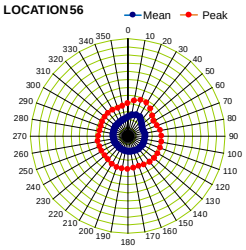
LOCATION54



LOCATION55



LOCATION56



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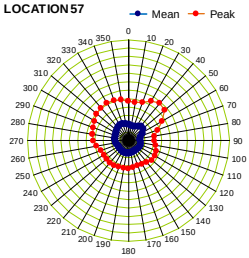
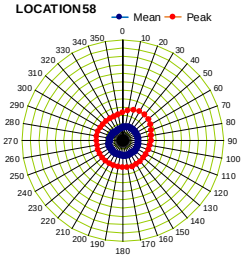
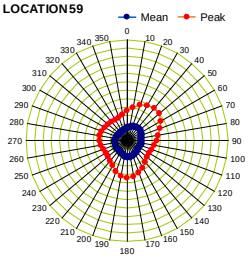


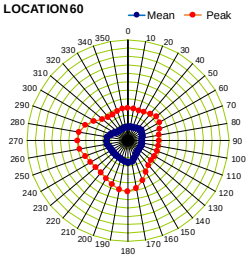
LOCATION58



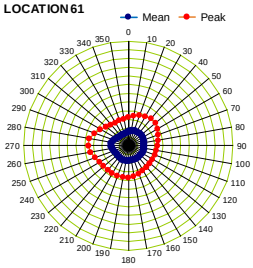
LOCATION59



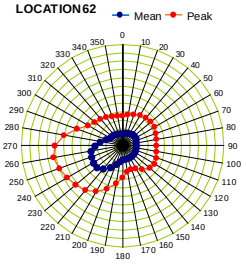
LOCATION60



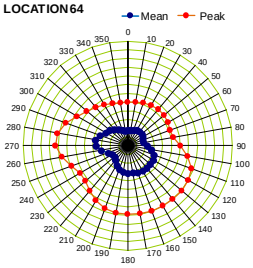
LOCATION61



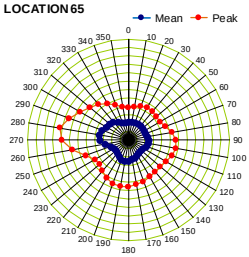
LOCATION62



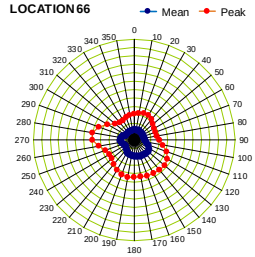
LOCATION64



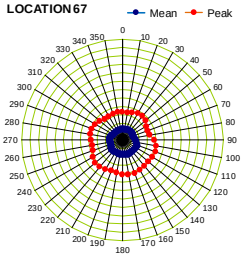
LOCATION65



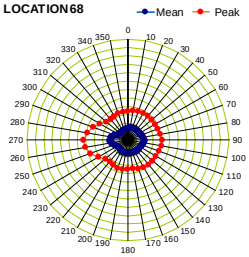
LOCATION66



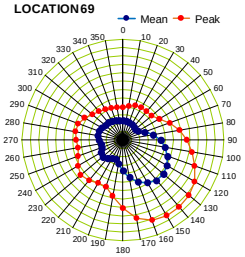
LOCATION67



LOCATION68



LOCATION69



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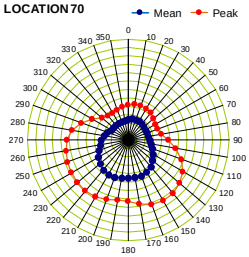
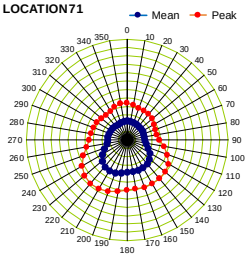


LOCATION71



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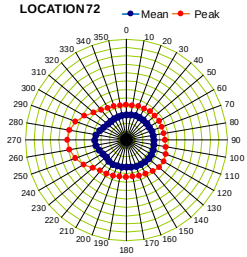
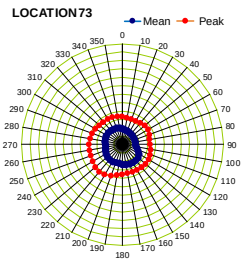
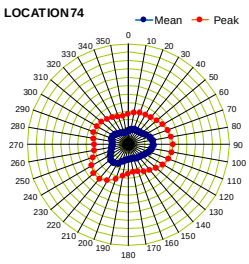
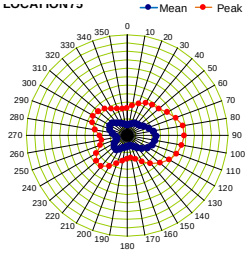



LOCATION73
Mean
Peak


LOCATION74
Mean
Peak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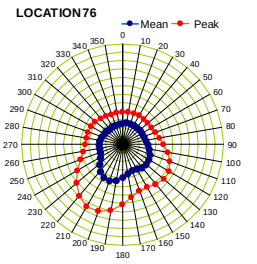
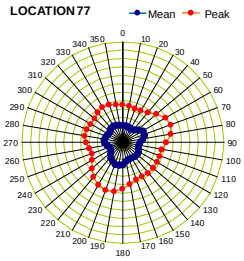
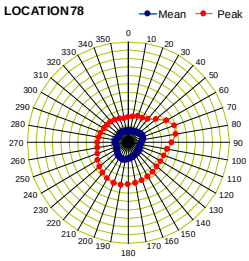
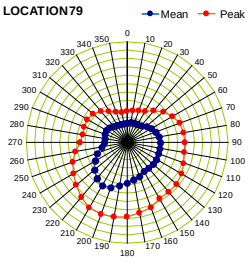
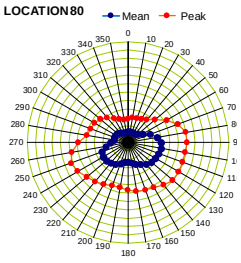
Peak


LOCATION76
Mean
Peak


LOCATION77
Mean
Peak


LOCATION78
Mean
Peak


LOCATION79
Mean
Peak


LOCATION80
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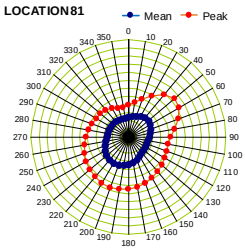
LOCATION81
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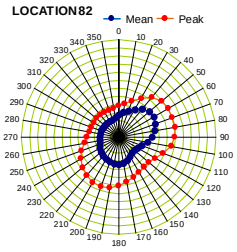
LOCATION82
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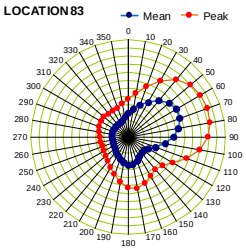
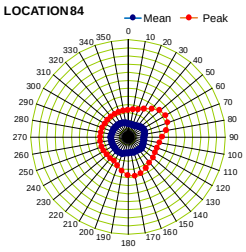

LOCATION83
Mean
Peak


LOCATION84
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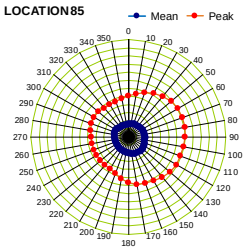
Peak


LOCATION85
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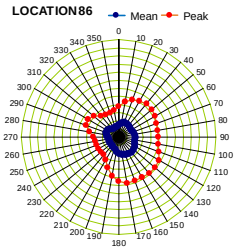
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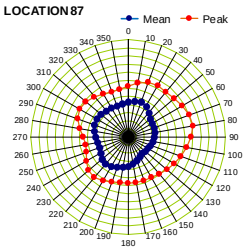
LOCATION87
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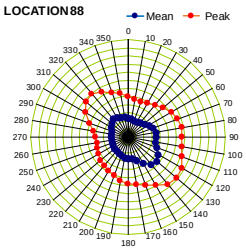
LOCATION88
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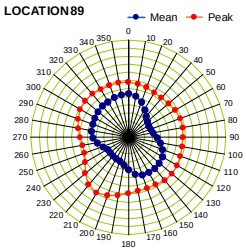
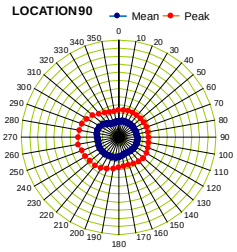

LOCATION89
Mean
Peak


LOCATION90
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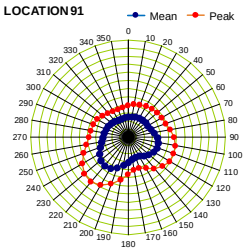
LOCATION91
Mean
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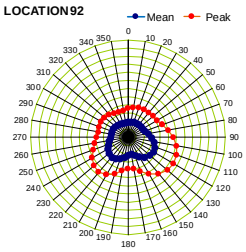
LOCATION92
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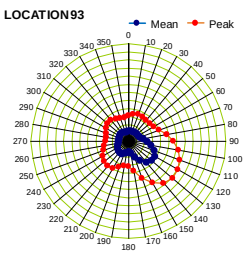
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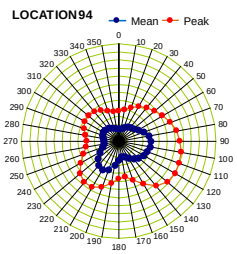
LOCATION94
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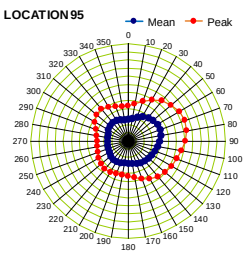
LOCATION95
Mean
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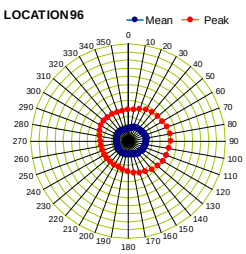
LOCATION96
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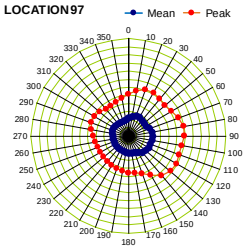
LOCATION97
Mean
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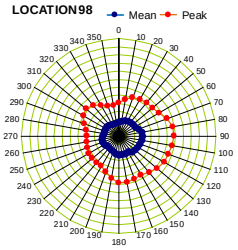
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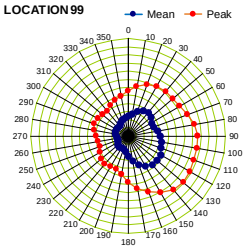
LOCATION99
Mean
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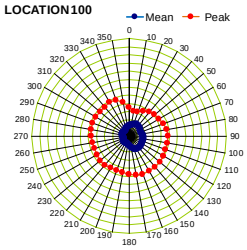
LOCATION100
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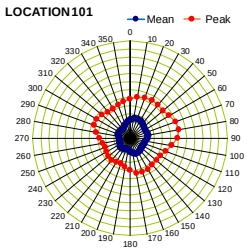
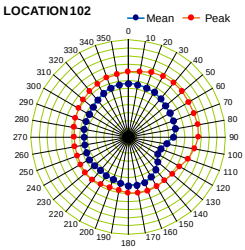
Peak


LOCATION101
Mean
Peak


LOCATION102
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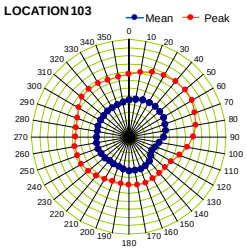
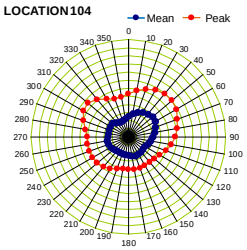
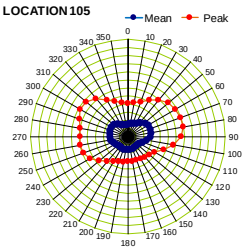
Peak


LOCATION103
Mean
Peak


LOCATION104
Mean
Peak


LOCATION105
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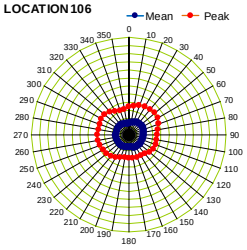
Peak


LOCATION106
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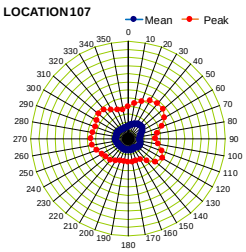
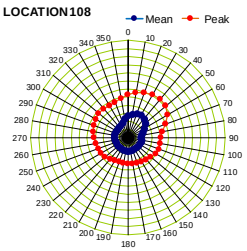
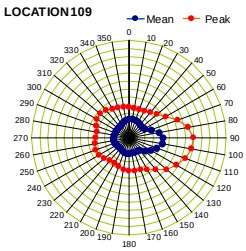
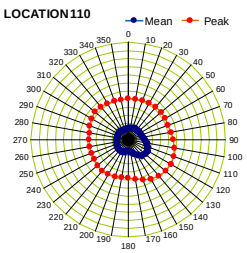
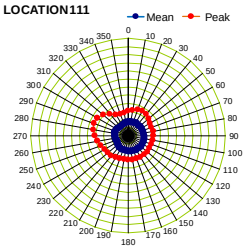

LOCATION107
Mean
Peak


LOCATION108
Mean
Peak


LOCATION109
Mean
Peak


LOCATION110
Mean
Peak


LOCATION111
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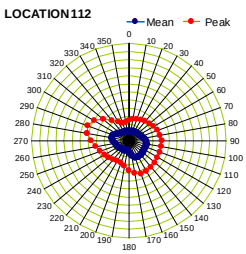
LOCATION112
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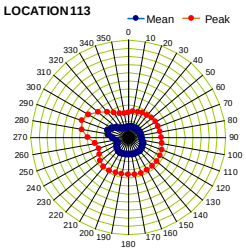
LOCATION113
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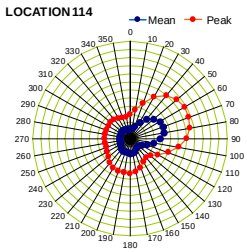
Peak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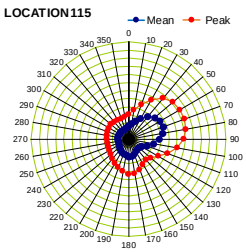
LOCATION115
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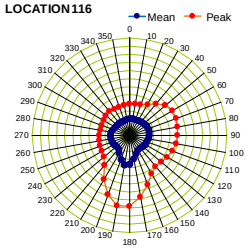
Peak


LOCATION116
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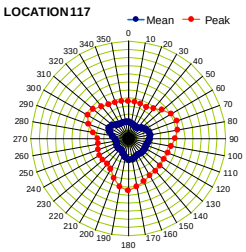
Peak


LOCATION117
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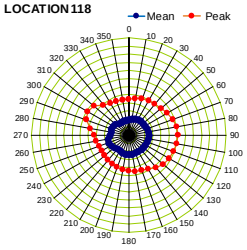
LOCATION118
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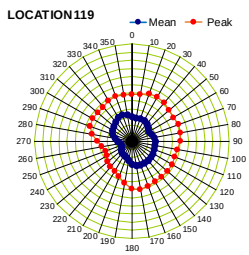
LOCATION119
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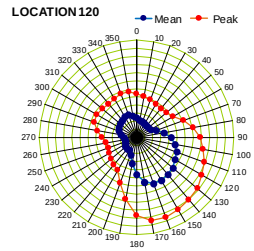
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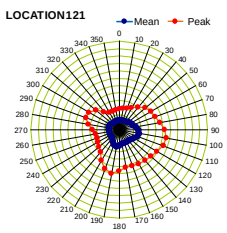
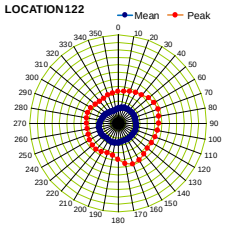

LOCATION121
Mean
Peak


LOCATION122
Mean
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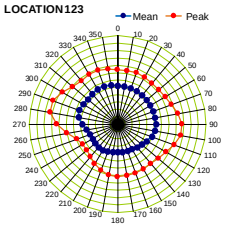
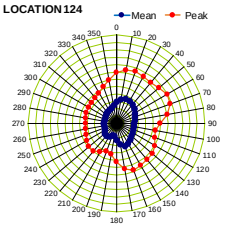
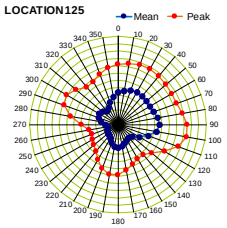

LOCATION123
Mean
Peak


LOCATION124
Mean
Peak


LOCATION125
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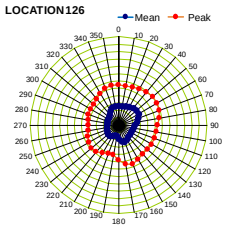
Peak


LOCATION126
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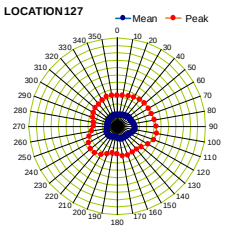
LOCATION127
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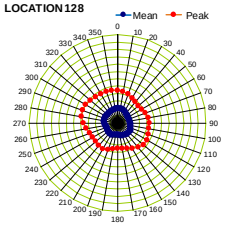
LOCATION128
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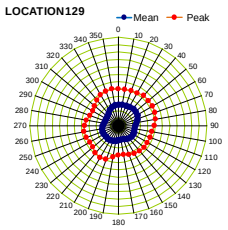
LOCATION129
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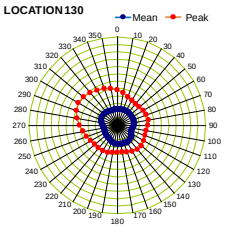
Peak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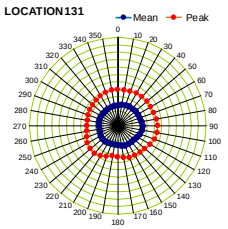
LOCATION131
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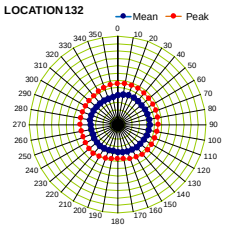
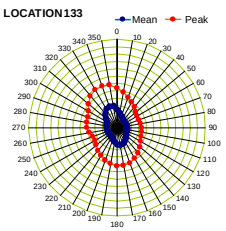

LOCATION132
Mean
Peak


LOCATION133
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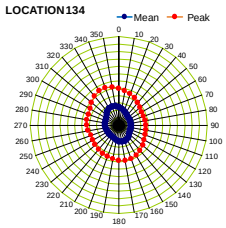
Peak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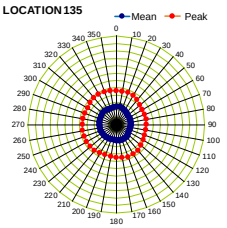
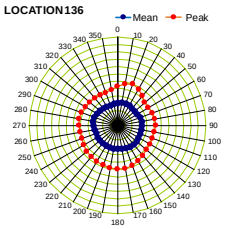
Mean
Peak


LOCATION135
Mean
Peak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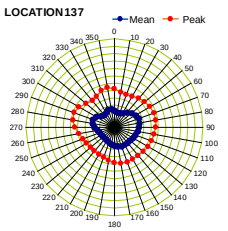
LOCATION137
Mean
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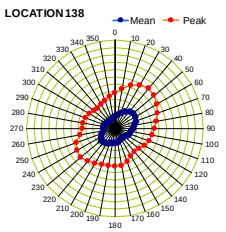
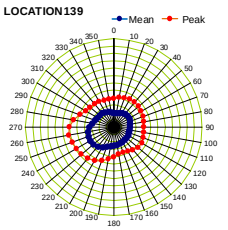
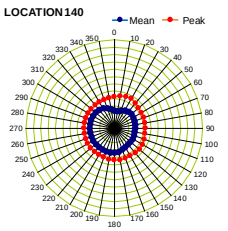

LOCATION138
Mean
Peak


LOCATION139
Mean
Peak


LOCATION140
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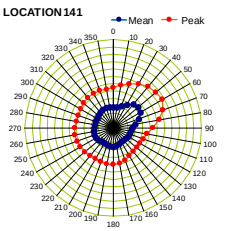
Peak


LOCATION141
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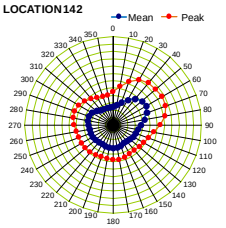
Peak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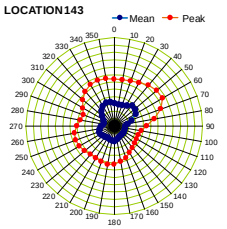
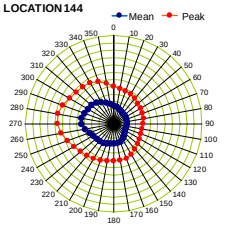
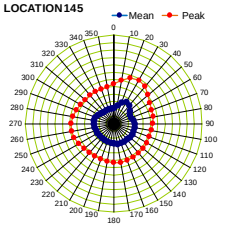
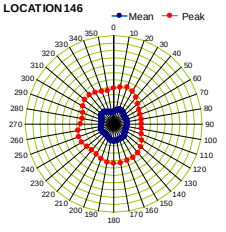
Peak


LOCATION143
Mean
Peak


LOCATION144
Mean
Peak

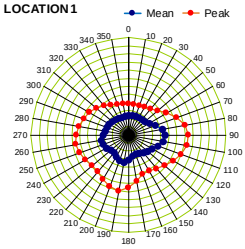

LOCATION145
Mean
Peak


LOCATION146
Mean
Peak

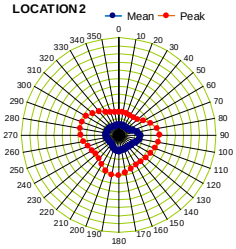
Appendix F Wind Tunnel Test Data (Polar Plots) – DESIGN GUIDE Scenario

The polar diagram plots show the local (ground level) mean and peak gust wind speed as a ratio of the mean reference wind speed (at a full-scale height of 200 m).The polar diagram circumferential lines representing gradations in 0.1 intervals, ie 10% ratios.

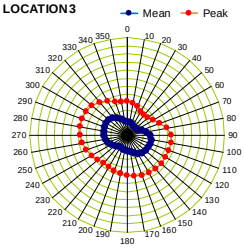
LOCATION1



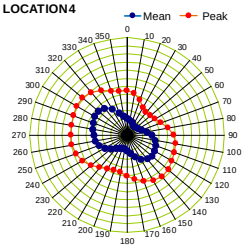
LOCATION2



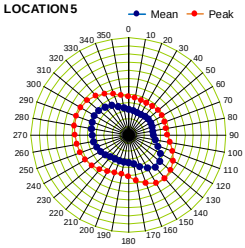
LOCATION3



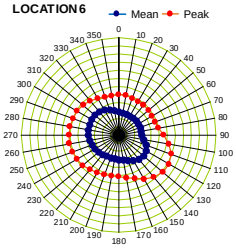
LOCATION4



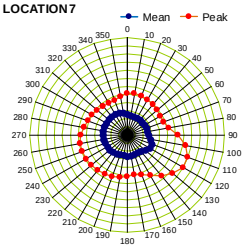
LOCATION5



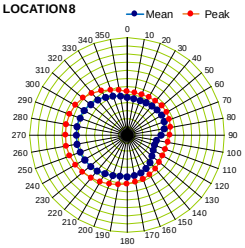
LOCATION6



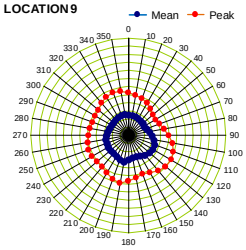
LOCATION7



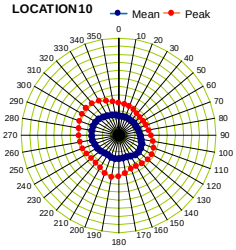
LOCATION8



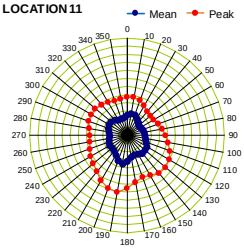
LOCATION9



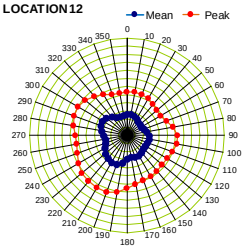
LOCATION10



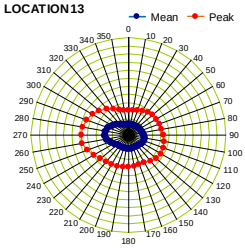
LOCATION11



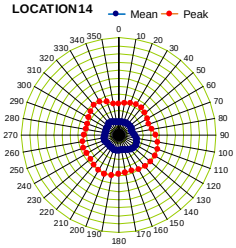
LOCATION12



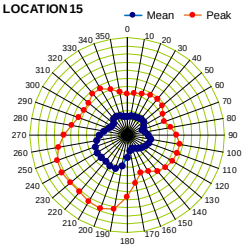
LOCATION13



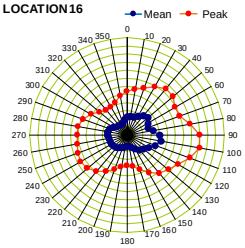
LOCATION14



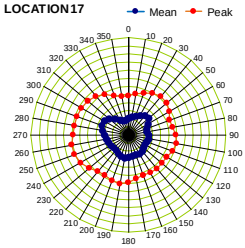
LOCATION15



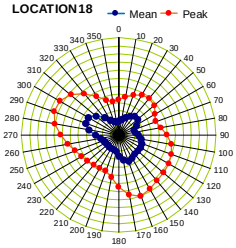
LOCATION16



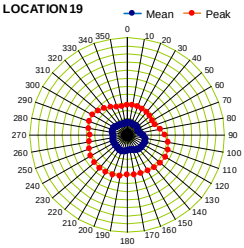
LOCATION17



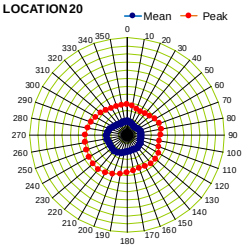
LOCATION18



LOCATION19



LOCATION20



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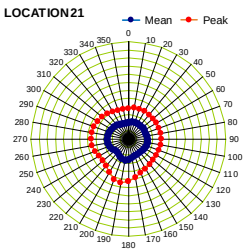

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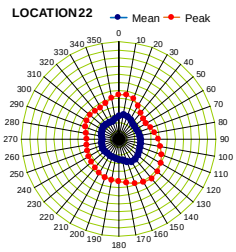

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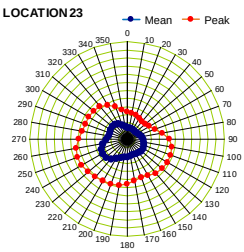

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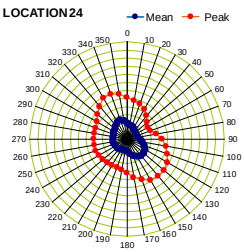

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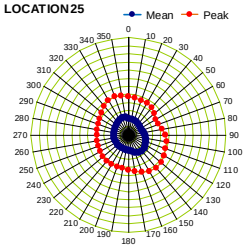

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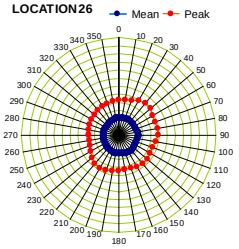

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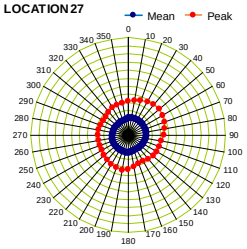

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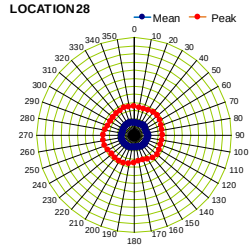

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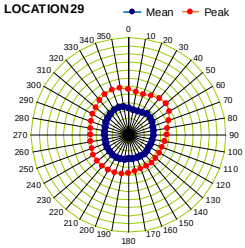

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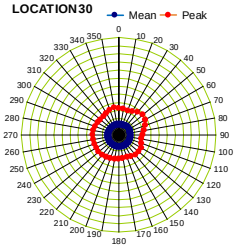

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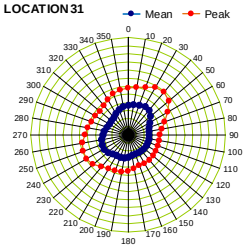

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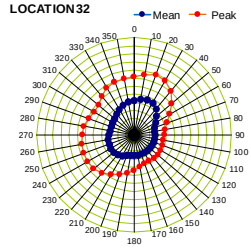

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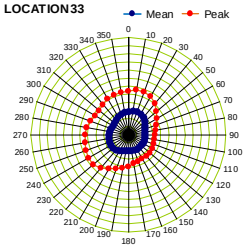

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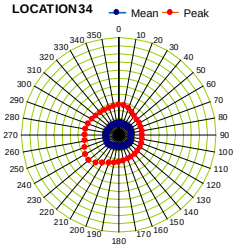

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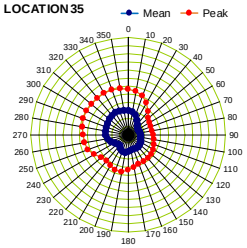

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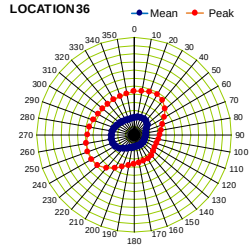

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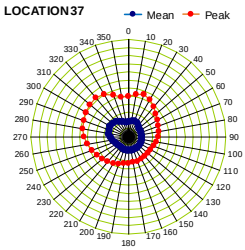

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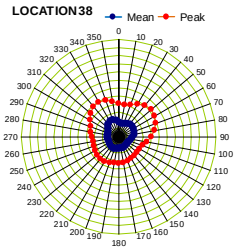

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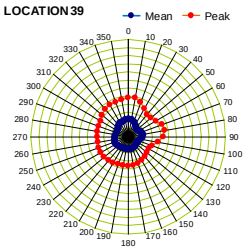

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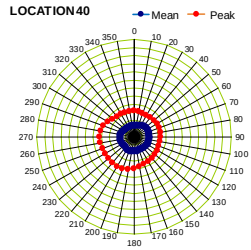

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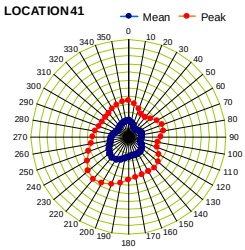

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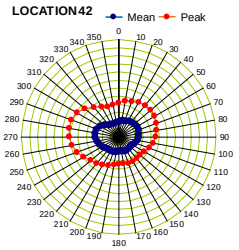

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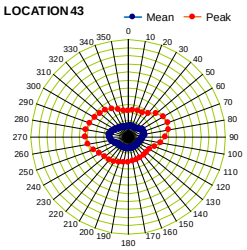

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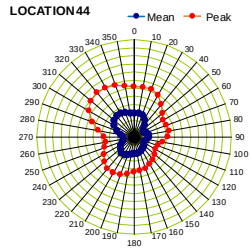

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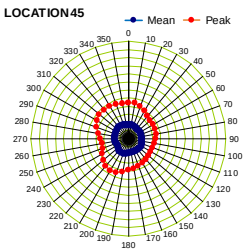

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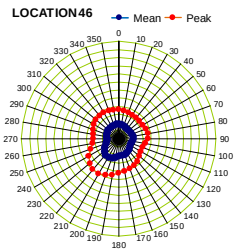

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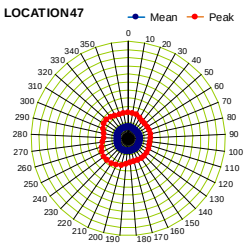

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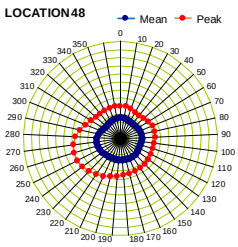

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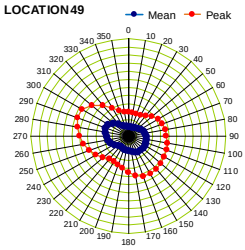

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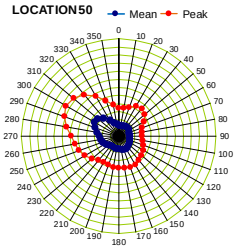

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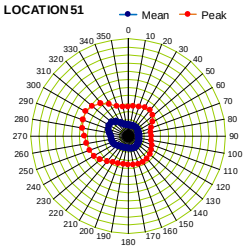

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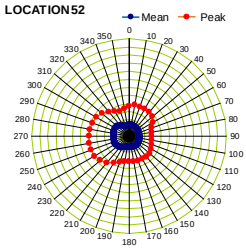

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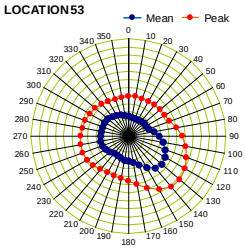

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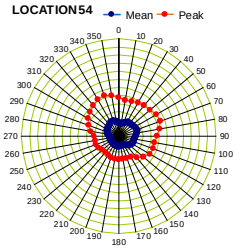

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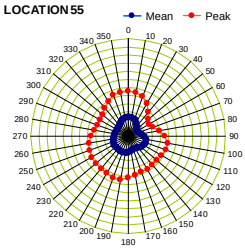

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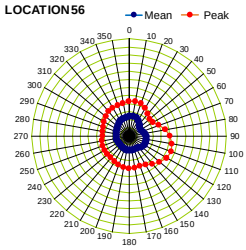

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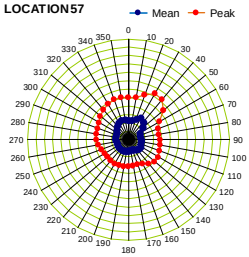

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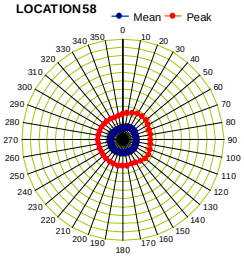

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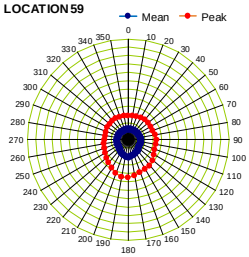

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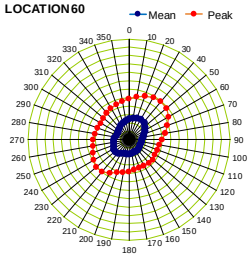

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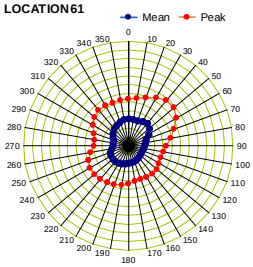

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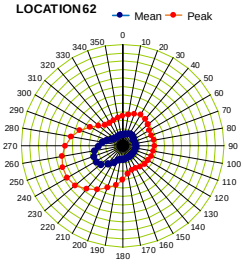

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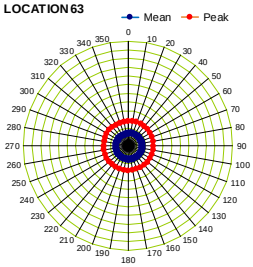

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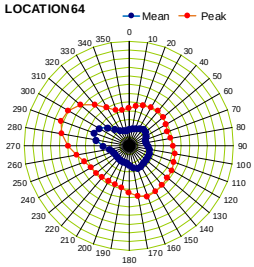

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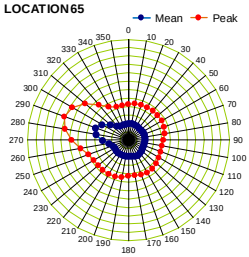

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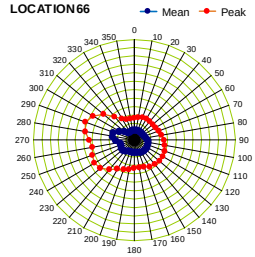

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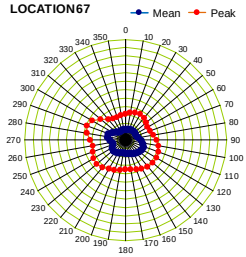

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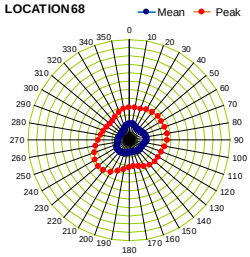

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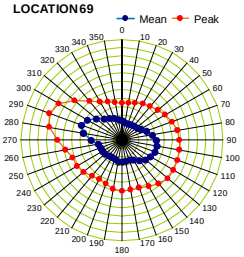

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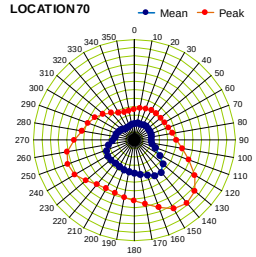

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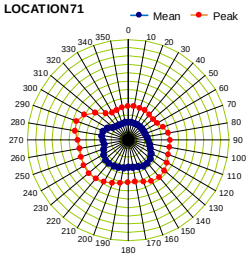

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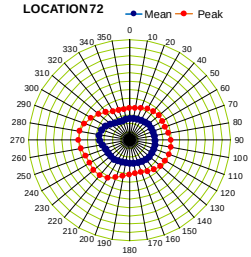
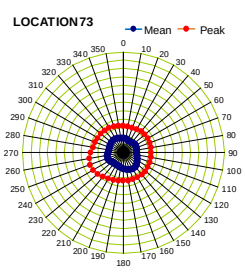
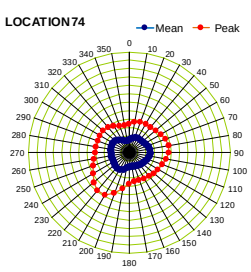



LOCATION73
Mean
Peak


LOCATION74
Mean
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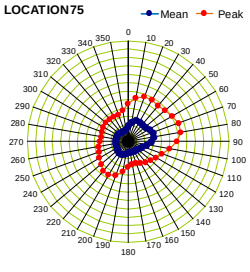
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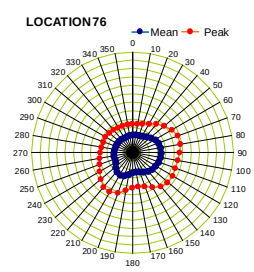
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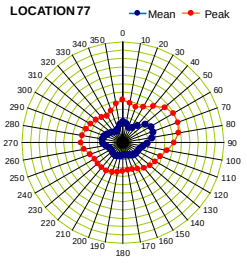
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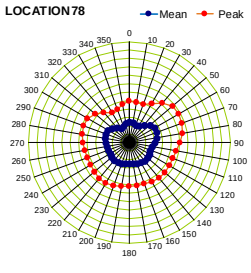
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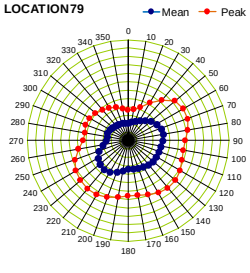
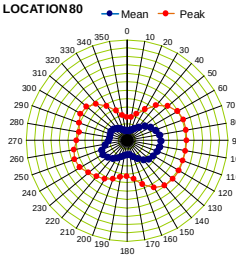

LOCATION79
Mean
Peak


LOCATION80
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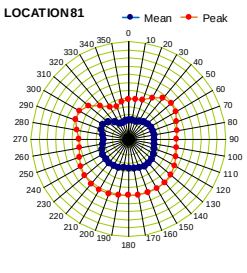
LOCATION81
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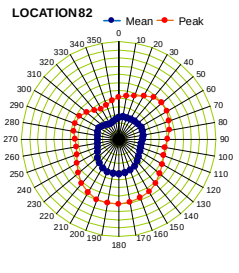
LOCATION82
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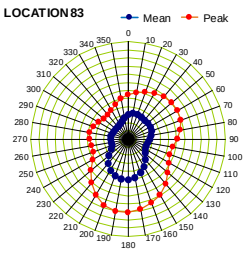
LOCATION83
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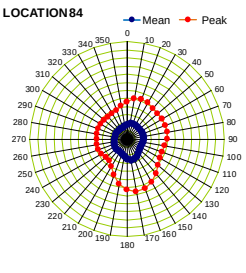
LOCATION84
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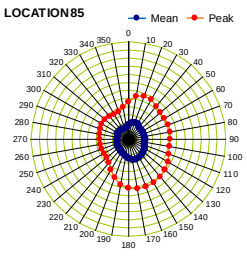
LOCATION85
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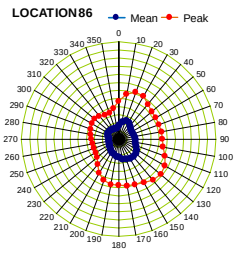
LOCATION86
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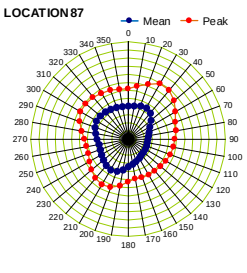
LOCATION87
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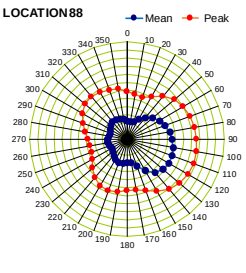
LOCATION88
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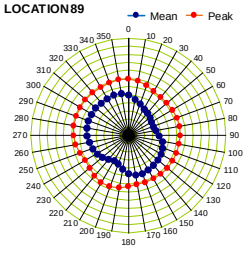
LOCATION89
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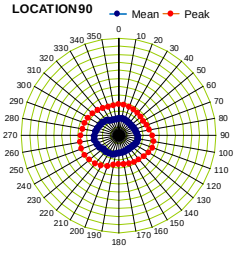
LOCATION90
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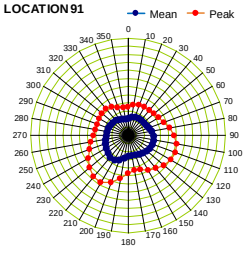
LOCATION91
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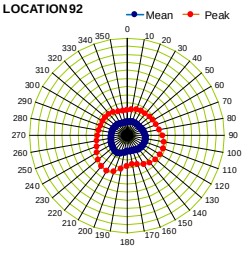
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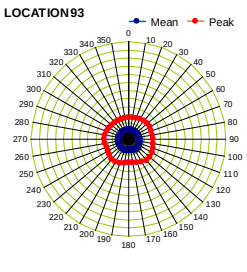
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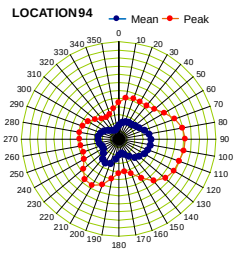
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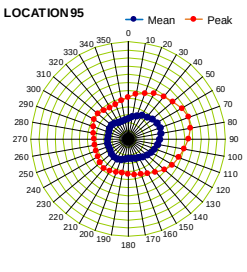
LOCATION95
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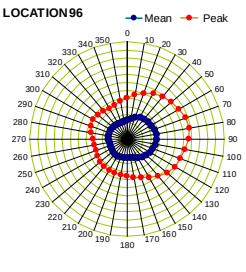
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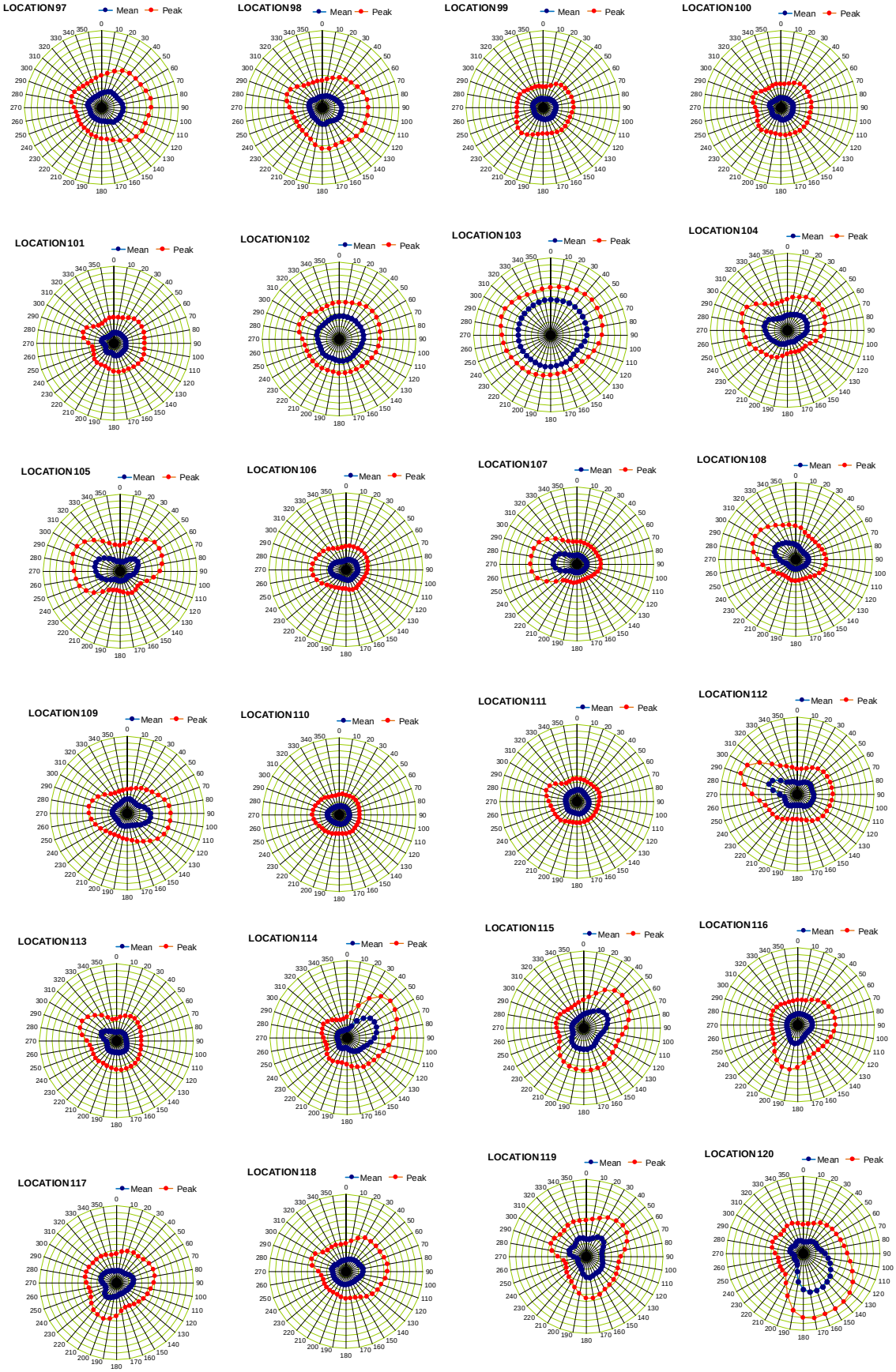
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LOCATION98
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LOCATION120
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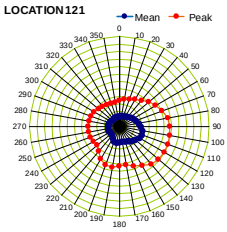
Peak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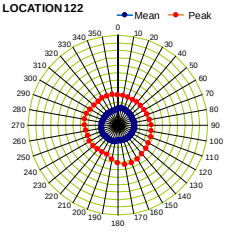
LOCATION122
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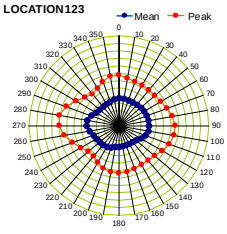
LOCATION123
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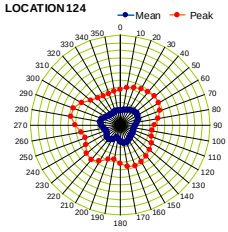
LOCATION124
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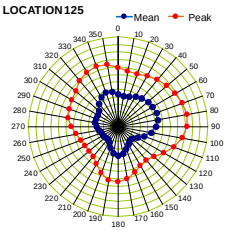
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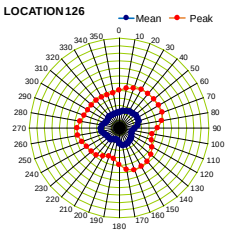
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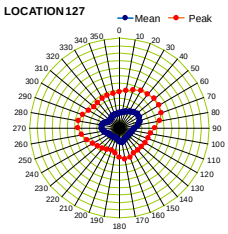
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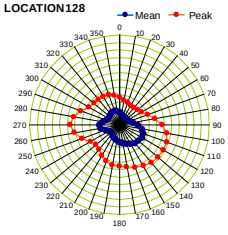
LOCATION128
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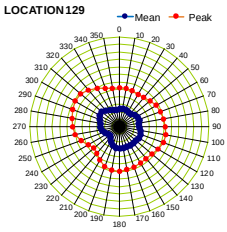
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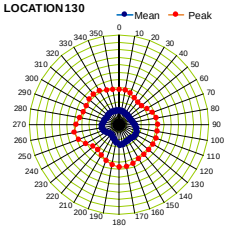
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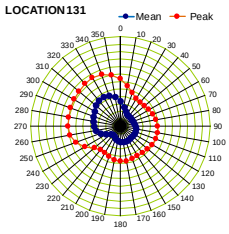
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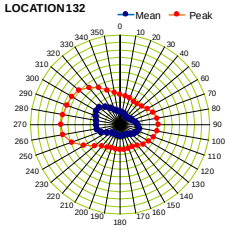
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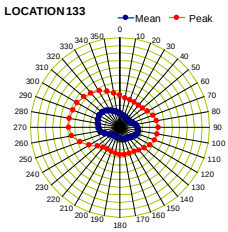
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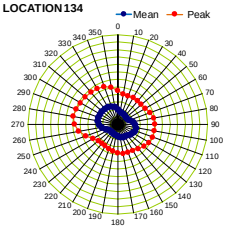
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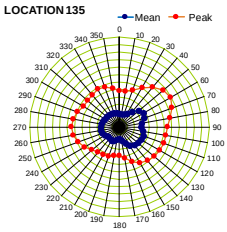
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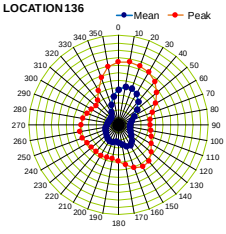
LOCATION136
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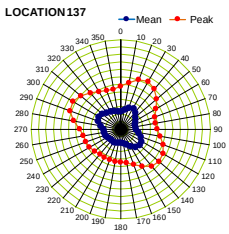
LOCATION137
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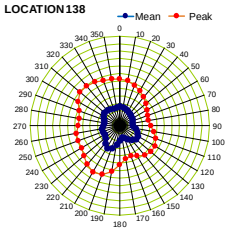
LOCATION138
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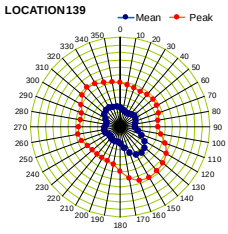
LOCATION139
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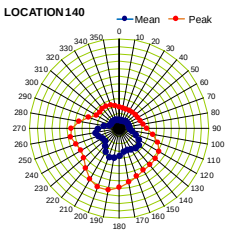
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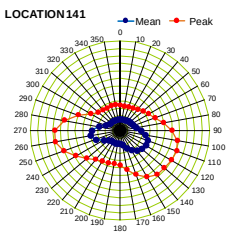
LOCATION141
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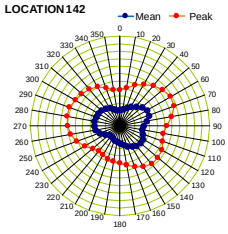
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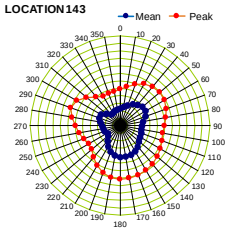
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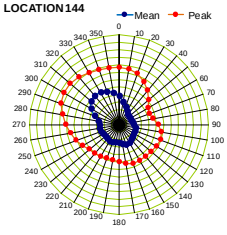
LOCATION144
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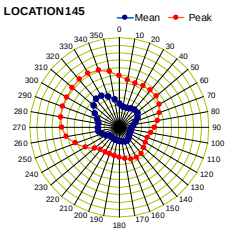
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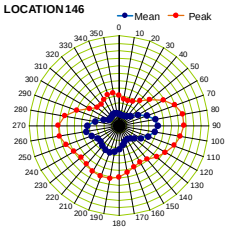
LOCATION146
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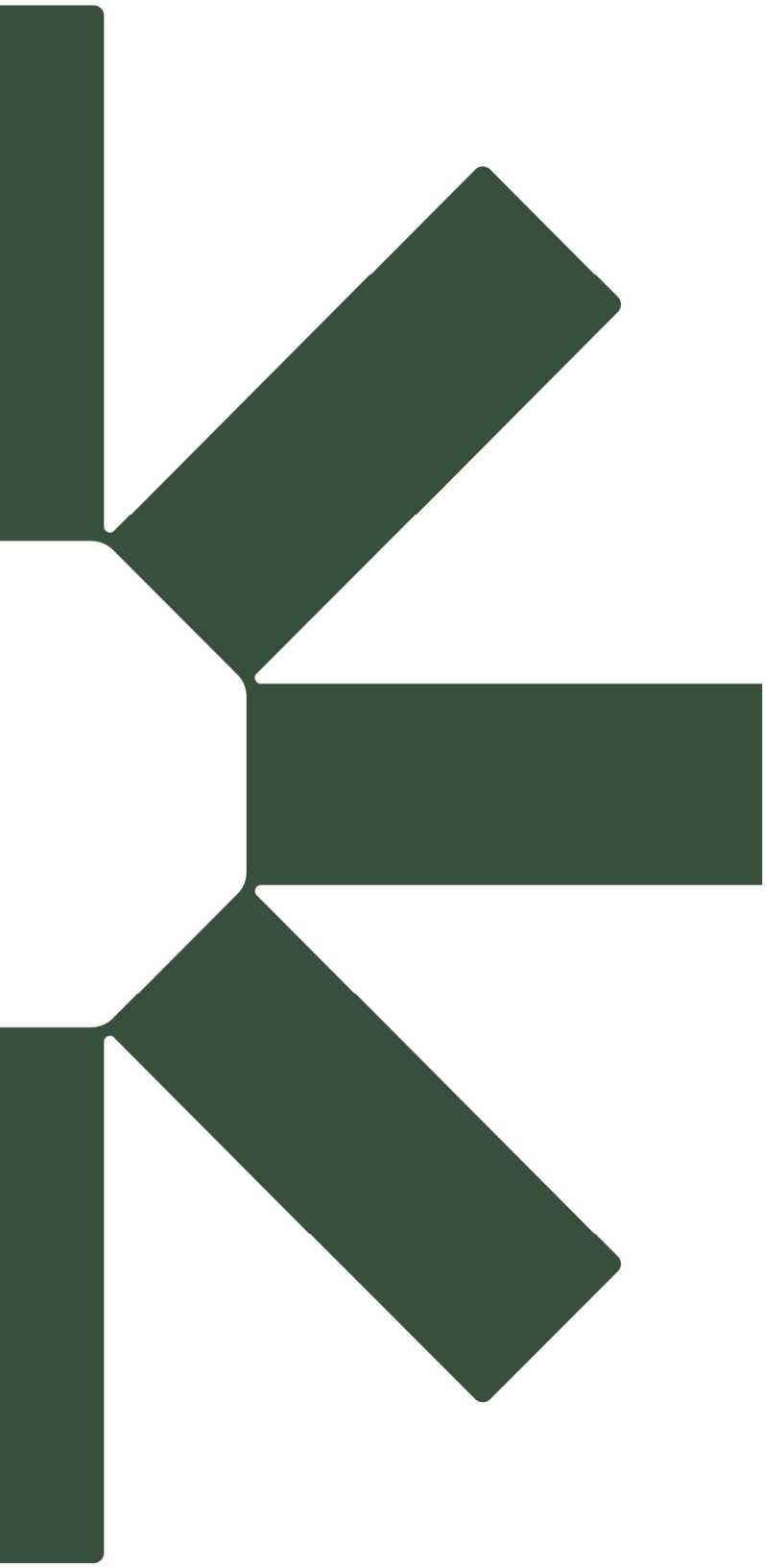

Making Sustainability Happen