NZCRE 100 Halsey Limited

Pedestrian Wind Study: 100 Halsey Street, Auckland

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This report ('Report') has been prepared by WSP exclusively for NZCRE 100 Halsey Limited ('Client') in relation to the wind study of the proposed development for 100 Halsey Street, Auckland, ('Purpose') and in accordance with our offer of service dated 9th August 2026. The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

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1 PROJECT BACKGROUND

1.1 OUTLINE

This report presents the results of a wind tunnel study of pedestrian wind conditions around a development proposal for 100 Halsey Street, in the Wynyard Quarter of the Auckland Central Business District. The proposal is for five multi-level buildings, ranging from around 35m to around 52m in height. Construction of these buildings will be staged over a 10-year timeframe.

The primary objectives of the wind tunnel study are (1) to quantify the extent and magnitude of any significant effects the proposed development has on pedestrian wind conditions relative to the wind standards in the Auckland Unitary Plan (AUP) and (2) to assess the need for wind mitigation in surrounding public pedestrian areas.

This investigation is intended to satisfy the reporting requirements of the AUP provisions relating to the wind effects of new buildings.

Wind tunnel testing was carried out using a 1:300 scale model of the development and the area around the development site. The scale model of the development design was built from plans drawn and provided by Peddlethorp Architects, dated 28/8/26. The level of detail on this model was consistent with design features expected to have an identifiable and measurable impact on wind conditions.

2 SITE, AREA AND PROPOSED DEVELOPMENT

2.1 DEVELOPMENT SITE

The proposed 100 Halsey Street development site occupies the larger part of a city block bounded by Pakenham Street to the north, Halsey Street to the east, Gaunt Street to the South, and Daldy Street to the west. Figure 1 shows the location of the site. Included on this aerial image are the site outline and the proposed building layout on the development site. There is currently a low-rise building at the southwest corner of the site, and a 27m high hotel at the northeast corner of the site (Travelodge), while the remainder is largely open space. The topography in the area is essentially flat, with most of the surrounding area ranging between 3m and 5m above sea level. Under the Auckland Unitary Plan, the site is in the Business – City Centre Zone.



Figure 1: Aerial view of the development site and surrounding area

(includes the proposed building layout (B1 – B5) on the development site)

2.2 SURROUNDING AREA

The 100 Halsey Street development site lies within the Wynyard Quarter which fronts onto the Waitemata Harbour west of the main Auckland Central Business district. Buildings in the surrounding area are a diverse mix of different sizes, designs, ages, styles and uses. They range in size from older one and two-storey blocks with approximately rectangular planforms, through to more modern multi-storey buildings with larger and more complex planforms. This area of central Auckland has seen significant redevelopment in recent years. Apart from the streets and adjacent footpaths, there are significant open spaces in the surrounding area, including most significantly, Amey Daldy Park immediately to the west of the site.

2.3 PROPOSED DEVELOPMENT

The proposed development for 100 Halsey Street comprises five buildings (B1-B5) laid out around a central plaza area. This layout can be seen in Figure 1. The construction of these buildings will be staged over a 10-year period, beginning with building B1. The new buildings range in height between around 35m and 52m in height. Figure 2 shows the heights and massing of the individual development buildings.



Figure 2: View showing the height and general massing of the 100 Halsey Street development buildings

All the buildings are approximately rectangular in plan, with rounded corners, and setback upper and/or rooftop levels. Figure 3 shows views of the wind tunnel model constructed for the study.



(a) View of the wind tunnel model of the development from the north



(b) View of the wind tunnel model of the development from the south

Figure 3: Views of the wind tunnel model of the proposed 100 Halsey St development (blue buildings).

3 WIND STANDARDS

3.1 AUCKLAND UNITARY PLAN

Auckland's Unitary Plan (Operative in Part (updated 11 September 2026)) contains policies that require developments in the City Centre zone to "avoid, remedy or mitigate" adverse wind effects on public open spaces, including adjacent streets. It sets standards that specify the pedestrian wind conditions considered appropriate for different pedestrian activities and corresponding spaces such as footpaths, roadways, and other public areas, including parks and public squares. These wind standards are the same for all zones in the city in which consideration of wind effects is required.

The Unitary Plan wind standards are based on two separate criteria, these being the probability of occurrence of mean wind speeds (Category A to Category E), and the maximum annual gust wind speed (safety criteria).

The wind standards require that developments must **not cause**:

(1) The mean speed around it to exceed the performance category for the intended use of the area;

(2) The average annual maximum peak 3 second gust speed to exceed 25m/s; and

(3) An existing wind speed that exceeds the controls in (1) and (2) above, to increase.

The relevant sections of the Unitary Plan relating to wind effects are given in Appendix A for the Business – City Centre Zone.

Mean Wind Speeds

The performance categories describe the wind conditions which would be experienced at a location during the year taking all the different wind directions that occur into account.

- Locations with Category A wind conditions have the lowest mean wind speeds.
- Locations with Category E wind conditions have the highest mean wind speeds, which the wind rules describe as dangerous and unacceptable.
- Category C wind conditions are the highest deemed acceptable for pedestrian footpaths and other pedestrian linkages, where there are no features that encourage recreation or relaxation, e.g. public seating.

Table 1 lists the wind performance categories, referenced later in the report, together with descriptions of the public spaces where the wind performance categories are considered acceptable under the Unitary Plan.

It is important to note that the Unitary Plan wind performance categories describe levels of wind conditions considered appropriate for different activities. The existing wind conditions at any location may actually be higher or lower than the Unitary Plan category considered appropriate for that location. For example, the Unitary Plan considers Category C conditions appropriate for a footpath, but a footpath in an exposed location such as in a waterfront space may currently already experience Category D conditions.

Table 1 Overall Mean Wind Speeds and Corresponding Wind Performance Categories

Category	Description (Unitary Plan)
A	Areas of pedestrian use containing significant formal elements and features intended to encourage longer term recreational or relaxation use, such as major and minor public squares, parks and other open spaces.
B	Areas of pedestrian use containing minor elements and features intended to encourage short term recreation or relaxation, such as minor pedestrian open spaces, pleasance areas in road reserves, and streets with significant groupings of landscape seating features.
C	Areas of formed footpath or open space pedestrian linkages, used primarily for pedestrian transit and devoid of significant or repeated recreational or relaxational features, such as footpaths not covered in categories A or B above.
D	Areas of road, carriage way, or vehicular routes, used primarily for vehicular transit and open storage, such as roads generally where devoid of any features or form which would include the spaces in categories A - C above.
E	Represents conditions which are dangerous to the elderly and infants and of considerable cumulative discomfort to others. Category E conditions are unacceptable and are not allocated to any physically defined areas of the city.

Gust Speeds

The safety criterion requires that a proposed development must **not cause** the maximum annual 3-second gust speed to exceed a value of 25m/s, which is the threshold considered to be dangerous under the Unitary Plan rules.

4 WIND TUNNEL TEST PROCEDURES

4.1 BACKGROUND

Wind tunnel testing to investigate the effects of proposed building developments on pedestrian level wind conditions involves combining the results of wind speed measurements made using scale models of the development and its surroundings with long-term full-scale Auckland meteorological data. This method provides predictions of (1) the mean wind speeds that are equalled or exceeded for specified periods of time, and (2) maximum annual 3 second gust speeds. These mean wind speeds are related to the Auckland Unitary Plan wind performance categories described in Section 3.

4.2 WIND TUNNEL MODEL

The wind tunnel model of the 100 Halsey Street development shown in Figure 3 was constructed at a scale of 1:300. This model included those details expected to have a significant impact on pedestrian wind conditions at street level. The surrounding area was modelled out to a full-scale radius of 400m.

4.3 IRWIN PROBE WIND SENSORS

The wind speed measurements were made using omni-directional Irwin probe wind sensors. Figure 4 shows a closeup view of one of these sensors installed on the Halsey Street model. A total of 80 sensors were installed at selected locations on the wind tunnel model, which are shown in Figure 5. These measurement locations included points on the surrounding streets, footpaths and open areas, as well as on the rooftop terraces of Building 3. Technical details of the Irwin probe instrumentation and signal processing are contained in Appendix B.



Figure 4: Irwin probe in position on the Halsey Street wind tunnel model.

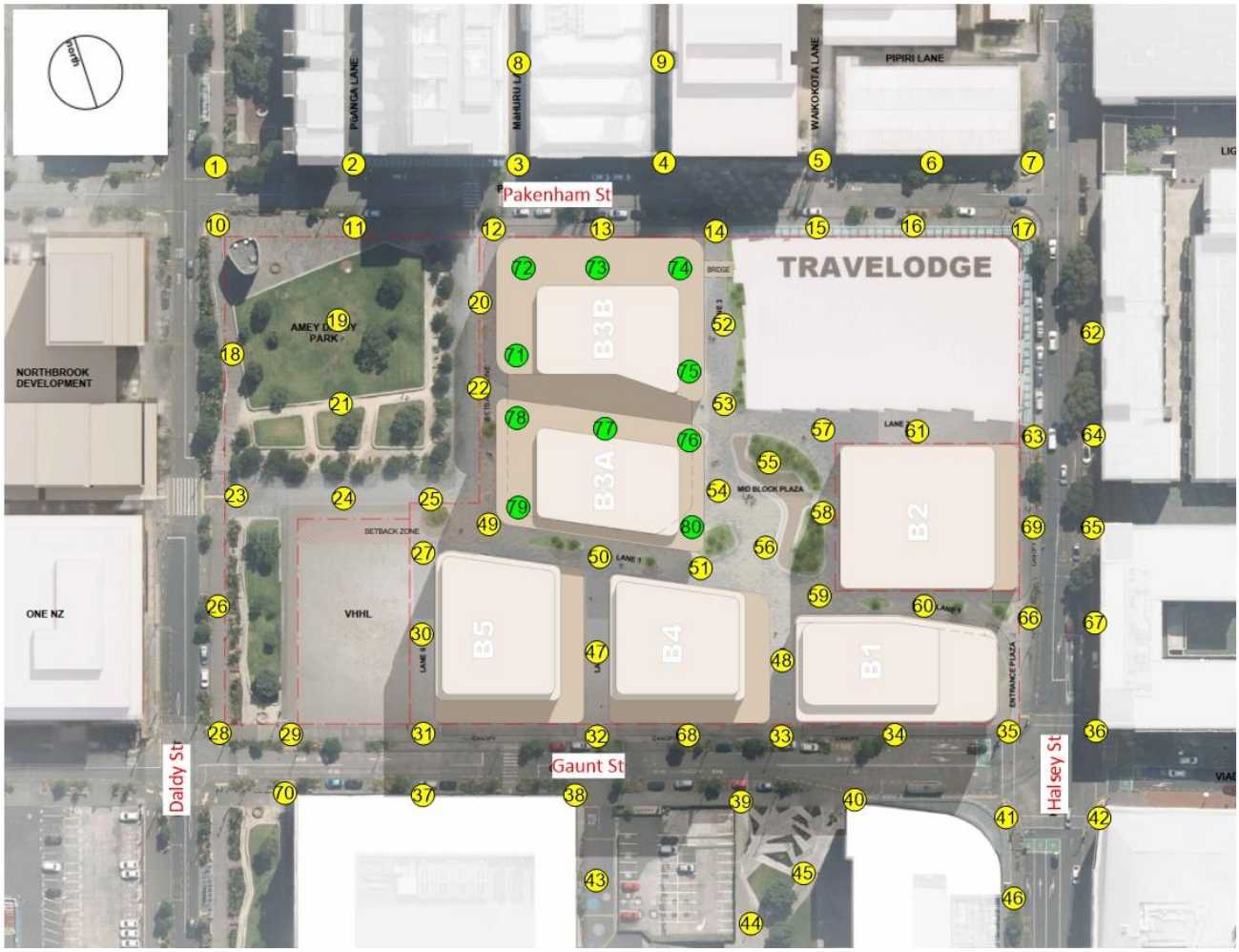


Figure 5: Wind speed measurement locations (yellow - street level, green – Building 3 roof terraces)

4.4 WIND SPEED MEASUREMENTS

The wind tunnel model of the development and the surrounding area were positioned on the turntable in the WSP Research recirculating boundary layer wind tunnel. The wind tunnel boundary layer was set up to reproduce conditions for approach flow (1) primarily over water (west through north to east), and (2) primarily over more built-up areas (east through south to west).

Measurements were taken simultaneously from each of the 80 Irwin probes at 1000Hz for a period of 60 seconds, for each 10° sector, for wind directions 0° through 350° (i.e. a full 360° rotation). Measurements were carried out for (1) the existing situation and (2) the proposed development.

5 WIND ENVIRONMENT

5.1 FULL-SCALE REFERENCE WIND SPEEDS

Meteorological wind data, from 2007 to 2025, has been analysed to derive full-scale reference wind speeds for the Halsey Street site, at a height of 150m above the ground. These reference wind speeds, listed in Table 2, are hourly mean wind speeds with a probability of exceedance of 50 hours/year. Details of the analysis is given in Appendix C.

The site reference wind speeds are used to scale the wind tunnel measurements to give pedestrian level wind speeds that can be compared directly to the wind standards specified in the Unitary Plan.

Table 2: Site reference wind speeds at 150m

Wind Direction (deg)	Reference Wind Speed (m/s)	Wind Direction (deg)	Reference Wind Speed (m/s)
10	9.9	190	5.8
20	11.2	200	8.5
30	12.1	210	11.3
40	11.5	220	13.2
50	10.8	230	13.8
60	11.3	240	13.4
70	10.3	250	13.0
80	6.7	260	13.0
90	3.8	270	11.1
100	4.4	280	10.1
110	3.7	290	9.3
120	5.4	300	8.4
130	6.1	310	8.9
140	6.0	320	7.1
150	4.8	330	6.6
160	4.6	340	6.2
170	4.6	350	5.9
180	4.7	360	7.0

6 WIND SPEED MEASUREMENTS

6.1 DATA ANALYSIS - MEAN WIND SPEEDS

Mean wind speeds measured in the wind tunnel are related to full-scale pedestrian wind conditions using the ratios of the wind speeds measured at heights corresponding to 1.5m (pedestrian level) and 150m (reference level) at full-scale. The pedestrian-level mean wind speeds that are calculated for each location and wind direction are equalled or exceeded for 50 hours per year for each 10° sector centred on the specified direction.

At each measurement location, the thirty-six directional mean wind speeds are combined using a directional probability analysis to produce a single non-directional wind speed that is exceeded for 50 hours per year.

Figure 6 shows the wind speed thresholds for the mean wind speed categories for 50 hours per year, based on the Unitary Plan wind environment control graph shown in Appendix A. For example, Figure 6 shows that a reported mean wind speed of 6.0m/s corresponds to Category B.

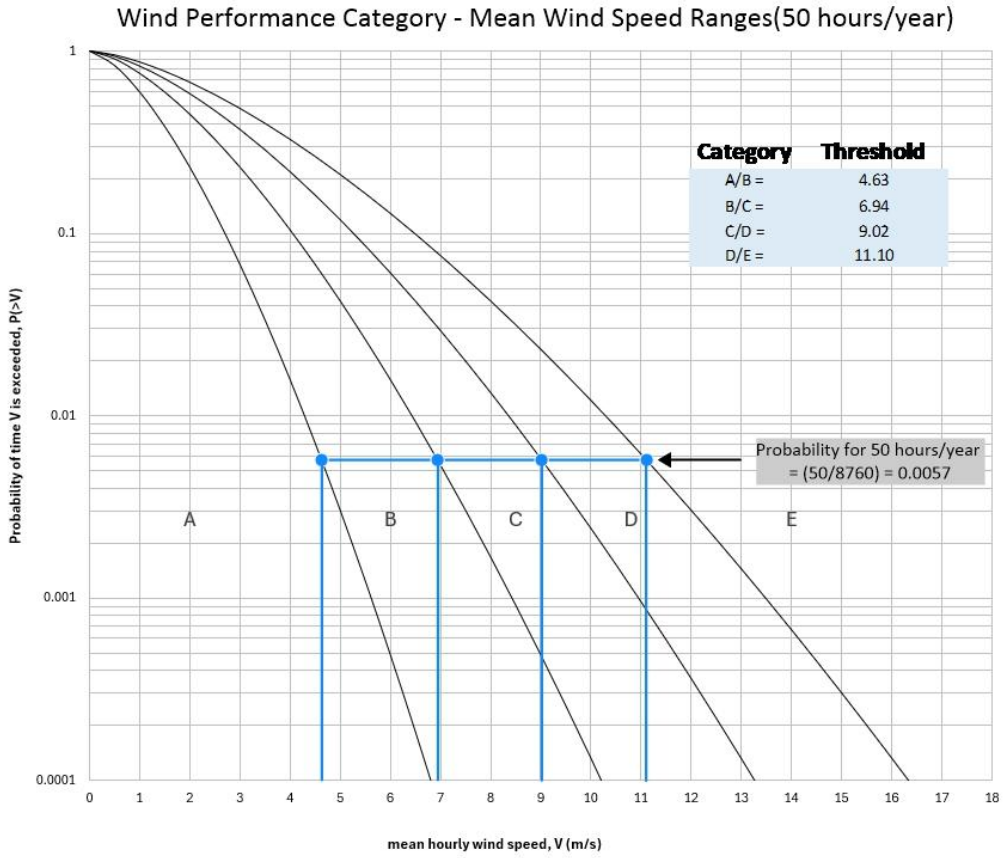


Figure 6: Mean wind speed ranges for Unitary Plan wind categories (50 hours/year)

6.2 DATA ANALYSIS – GUST SPEEDS

Gust speeds have been determined by combining the mean wind speed and the standard deviation using a peak factor to provide a 'calculated gust speed', V_c, defined as,

$$V_c = V_{mean} + 3.7\, V_{rms}$$

where V_{mean} is the maximum annual hourly mean wind speed, and V_{rms} is the standard deviation corresponding to this mean speed, and 3.7 is the peak factor corresponding to a 3-second equivalent gust.

The calculated gust speed corresponds to the maximum 3-second gust that would be expected during the hour with the highest mean wind speed each year.

At each location, the calculated gust speeds for each wind direction are combined using a directional probability analysis to produce a single non-directional calculated gust speed that is compatible with the gust speed specified in the Auckland Unitary Plan safety criterion.

6.3 RESULTS

6.3.1 MEAN WIND SPEEDS

The non-directional mean wind speeds and the corresponding performance categories at each location are listed in Table 3. Note that the mean wind speeds are rounded to the nearest single 0.1 m/s.

We estimate that a change of less than 0.5 m/s is not significant within the limitations of the test method. Consequently, a change of less than 0.5 m/s that results in the category changing is not considered a measurable change in wind conditions. To make this clear, a measurable change in wind performance category is indicated in Table 3 by a ▲ or ▽ symbol. The different performance categories have also been colour coded.

The performance categories for the existing situation are shown graphically in Figure 7 and for the proposed development in Figure 8. Figure 9 shows (1) the locations where significant changes in the wind performance category occur between the two configurations, and (2) the magnitude of the change in mean speed between the two configurations. The pedestrian-level mean wind speeds (equalled or exceeded for 50 hours per year) for each wind direction are listed in Appendix E.

Table 3: Mean Wind Speeds and Wind Performance Categories.

Note: Exg = existing situation, New = proposed development, - = not measured

▲ = measurable increase relative to existing conditions,

▽ = measurable reduction relative to existing conditions.

Category A *Category B* *Category C* *Category D* *Category E*

Location	Mean wind speed (m/s)		Wind Performance Category		
	Exg	New	Exg	New	Change from Exg
1	5.2	4.6	B	A	▽
2	5.0	4.1	B	A	▽
3	5.8	6.9	B	B	
4	5.8	6.0	B	B	
5	7.0	4.7	C	B	▽
6	6.4	3.8	B	A	▽
7	5.0	3.8	B	A	▽
8	7.0	5.8	C	B	▽
9	4.6	4.2	B	A	
10	5.8	5.6	B	B	
11	4.4	4.2	A	A	
12	5.1	8.3	B	C	▲
13	4.6	4.2	A	A	
14	6.1	4.9	B	B	
15	5.2	5.3	B	B	
16	4.9	4.4	B	A	▽
17	4.3	4.1	A	A	
18	5.3	5.7	B	B	
19	4.5	5.6	A	B	▲
20	4.1	5.6	A	B	▲
21	5.0	6.9	B	B	
22	4.1	4.1	A	A	
23	8.7	8.5	C	C	
24	5.8	6.8	B	B	
25	4.8	6.6	B	B	
26	6.9	8.3	B	C	▲
27	5.1	7.1	B	C	▲
28	9.4	9.4	D	D	
29	9.3	7.8	D	C	▽
30	3.9	4.7	A	B	▲
31	4.9	6.1	B	B	
32	4.3	5.2	A	B	▲
33	6.0	7.1	B	C	▲
34	4.3	7.3	A	C	▲
35	3.6	9.8	A	D	▲
36	4.6	5.5	B	B	
37	4.8	6.7	B	B	

Table 3: Mean Wind Speeds and Wind Performance Categories (continued).

Note: Exg = existing situation, New = proposed development, - = not measured

▲ = measurable increase relative to existing conditions,

▽ = measurable reduction relative to existing conditions.

Category A *Category B* *Category C* *Category D* *Category E*

Location	Overall mean wind speed (m/s)		Wind Performance Category		
	Exg	New	Exg	New	Change from Exg
38	5.7	6.4	B	B	
39	6.7	6.6	B	B	
40	7.1	7.2	C	C	
41	5.4	6.4	B	B	
42	5.9	6.3	B	B	
43	5.0	3.4	B	A	▽
44	7.6	5.8	C	B	▽
45	5.8	5.2	B	B	
46	6.9	8.9	B	C	▲
47	-	7.7	-	C	
48	-	9.8	-	D	
49	4.2	4.3	A	A	
50	-	6.0	-	B	
51	-	5.2	-	B	
52	-	3.4	-	A	
53	-	3.4	-	A	
54	-	4.8	-	B	
55	-	5.9	-	B	
56	-	5.8	-	B	
57	-	6.0	-	B	
58	-	7.9	-	C	
59	-	4.7	-	B	
60	-	4.4	-	A	
61	-	4.2	-	A	
62	4.2	3.4	A	A	
63	8.1	5.2	C	B	▽
64	5.1	3.5	B	A	▽
65	7.2	6.6	C	B	▽
66	4.6	5.6	A	B	▲
67	3.6	9.0	A	C	▲
68	4.1	5.6	A	B	▲
69	7.6	5.9	C	B	▽
70	8.6	6.8	C	B	▽
71	-	5.5	-	B	
72	-	7.2	-	C	

Table 3: Mean Wind Speeds and Wind Performance Categories (continued).

Note: Exg = existing situation, New = proposed development, - = not measured

▲ = measurable increase relative to existing conditions,

▽ = measurable reduction relative to existing conditions.

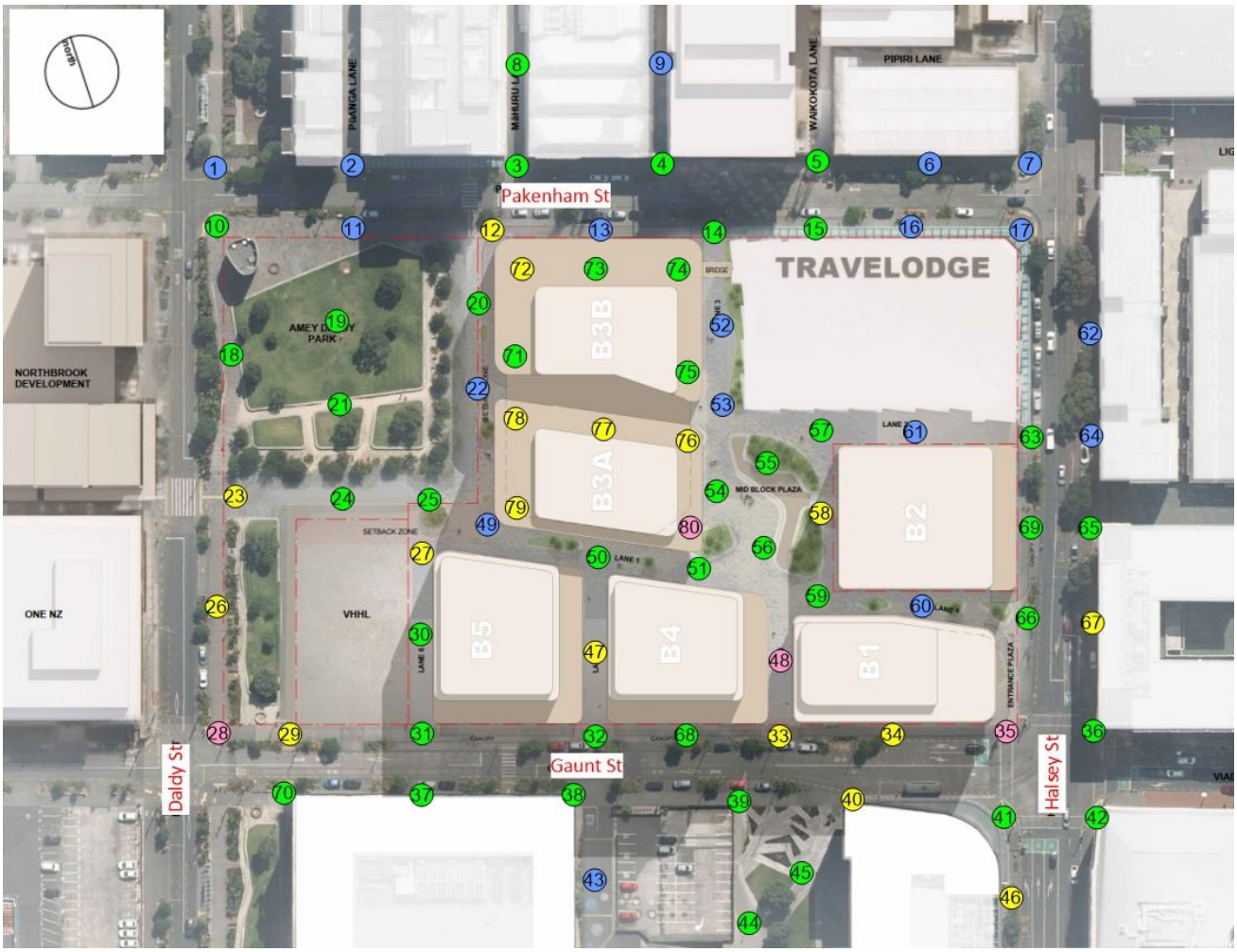
Category A *Category B* *Category C* *Category D* *Category E*

Location	Overall mean wind speed (m/s)		Wind Performance Category		
	Exg	New	Exg	New	Change from Exg
73	-	6.3	-	B	
74	-	5.7	-	B	
75	-	5.0	-	B	
76	-	7.1	-	C	
77	-	7.8	-	C	
78	-	8.9	-	C	
79	-	7.7	-	C	
80	-	9.6	-	D	



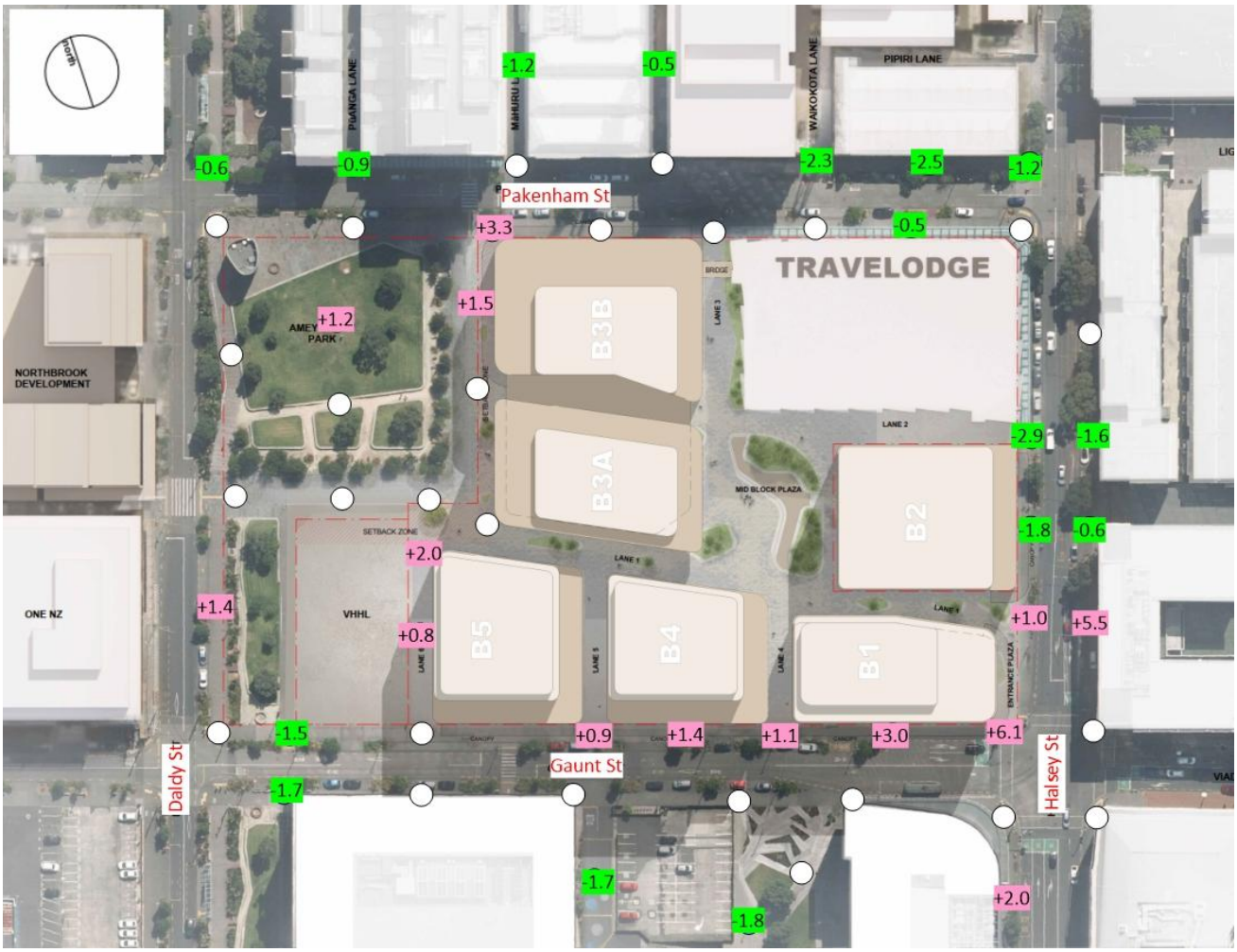
	Category A		Category B		Category C		Category D		Category E

Figure 7: Wind performance categories at measurement locations – existing situation



	Category A		Category B		Category C		Category D		Category E

Figure 8: Wind performance categories at measurement locations – proposed development



No Change in Category		Reduction in category		Increase in category	

Figure 9: Changes in wind speed (+/-) where a change in Unitary Plan wind performance category also occurred between the existing situation and proposed development (number = change in mean speed (m/s))

6.3.2 GUST WIND SPEEDS

Non-directional gust speeds are listed in Table 4. The gust speeds calculated for each wind direction and configuration are listed in Appendix E. Note that the gust wind speeds are rounded to the nearest 1 m/s. We estimate that a change of less than 1 m/s in the overall gust speed is not measurable repeatably within the limitations of the test method.

Table 4: Maximum Gust Speeds.

Notes: Exg = existing situation, New = proposed development, - = not measured

▲ = measurable increase in gust wind speed relative to existing wind conditions,

▽ = measurable reduction in gust wind speed relative to existing wind conditions.

= gust wind speeds > 25m/s

Location	Exg	New		Location	Exg	New	
1	18	17		41	22	24	▲
2	18	15	▽	42	23	23	
3	22	20	▽	43	22	16	▽
4	21	20		44	29	27	▽
5	21	19	▽	45	23	23	
6	25	16	▽	46	23	25	▲
7	19	16	▽	47	-	21	
8	23	20	▽	48	-	25	
9	17	17		49	19	17	▽
10	20	20		50	-	20	
11	18	20	▲	51	-	18	
12	22	24	▲	52	-	14	
13	18	17		53	-	16	
14	20	17	▽	54	-	20	
15	20	19		55	-	23	
16	18	17		56	-	19	
17	19	18		57	-	23	
18	24	25		58	-	20	
19	20	24	▲	59	-	19	
20	18	20	▲	60	-	15	
21	21	24	▲	61	-	18	
22	17	17		62	18	16	▽
23	29	28		63	26	20	▽
24	22	25	▲	64	18	13	▽
25	18	22	▲	65	22	20	▽
26	30	31		66	22	22	
27	19	23	▲	67	16	25	▲
28	29	29		68	16	19	▲
29	26	24	▽	69	26	21	▽
30	15	17	▲	70	26	22	▽
31	23	21	▽	71	-	21	
32	17	19	▲	72	-	24	
33	24	22	▽	73	-	22	
34	19	21	▲	74	-	21	
35	16	29	▲	75	-	21	
36	19	21	▲	76	-	23	
37	21	22		77	-	28	
38	25	21	▽	78	-	27	
39	26	25		79	-	24	
40	26	25		80	-	34	

7 DISCUSSION OF RESULTS

7.1 WIND ENVIRONMENT - EXISTING

Existing wind conditions near the development site are a mix of mostly Category A and B, with localised areas of Category C, and two locations of Category D near the intersection of Daldy Street and Gaunt Street. This indicates a relative uniformity of wind conditions driven mostly by horizontal wind flows around and between the surrounding mostly low-rise to medium-rise buildings, with the higher wind conditions occurring around some of the taller or more exposed buildings.

7.2 WIND ENVIRONMENT - PROPOSED DEVELOPMENT

The five buildings that make up the proposed development occupy an area that currently has one existing low-rise building on it, with the larger part of the site being vacant open space. In addition, the proposed buildings are taller than many of the surrounding buildings, particularly those to the east through south and southwest. Accordingly, existing horizontal ground level wind flows that currently blow across the open site are redirected and channelled by the proposed buildings, with some additional wind flows also being deflected down the windward faces of the proposed buildings into the adjacent pedestrian areas. Conversely, some areas downwind of the proposed buildings are more sheltered by the bulk of the proposed buildings.

Table 5 summarises the mean wind speed data listed in Table 3. This includes the average, maximum and minimum mean speeds across all measurement locations. Also included in this table are the numbers of locations in each wind performance category.

Table 5: Summary of Non-directional Mean Wind Speed Results – Street Level.
Notes: Exg = existing situation, New = proposed development.

Parameter	Configuration	
	Exg	New
Average of non-directional mean wind speeds[1] (m/s)	5.4	5.9
Maximum non-directional mean wind speed[2] (m/s)	9.4	9.8
Minimum non-directional mean wind speed[2] (m/s)	3.5	3.4
Number of locations		
Category A	23	18
Category B	36	37
Category C	9	12
Category D	2	3
Category E	0	0

1 – average for all measurement locations, 2 – maximum or minimum for all measurement locations.

The wind speed data, including that listed in Tables 3, 4, and 5, and presented in Figures 7, 8 and 9 shows the following:

- There are no locations where the development increases wind conditions to Category E.
- There is one location (35) where the development increases conditions from Category A to Category D, and one location (29) where the development reduces conditions from Category D to Category C. There is also one location (48) within the development site where the wind conditions are identified as Category D.

- Figure 9 and Table 5 suggest that, while both increases and reductions in wind conditions were identified, the redistribution of wind flows around the development has causes an overall small net deterioration in the local mean wind speed environment. The most significant area of deterioration was identified in Gaunt Street, increasing to a maximum at the southeast corner of Building 1 (location 35).
- Existing wind conditions in Amey Daldy Park, including around its perimeter range from Category A to C, being predominantly A and B. Similarly, wind conditions in Amey Daldy Park with the proposed buildings also range from Category A to C, being predominantly A and B.
- Mean wind conditions at most other locations are largely unchanged.
- Compared to the existing situation, the proposed development causes a reduction in the number of locations where the gust speeds exceed the 25m/s Unitary Plan Safety Criterion from 10 to 5. However, the development does increase the gust speed at one location (35) from 16m/s to 29m/s.
- Mean wind conditions on the rooftop terraces on Building 3 range from Category B to Category D, and the corresponding gust speeds range from 21 to 34m/s. Accordingly, without additional wind protection, some of the spaces on the terrace areas will have wind conditions higher than are considered appropriate for the intended uses of these spaces. However, for significant periods of time wind speeds will be appropriate for the intended uses, while during windy periods people will generally choose to vacate the areas, and at the windiest of times access to these spaces should be controlled.

7.3 ASSESSMENT OF DESIGN - OVERALL

All the five buildings in the proposed development design incorporate rounded corners, which help to some degree to improve the buildings' aerodynamic performance. Four of the five buildings also incorporate significant canopy elements, which do provide shelter for the pedestrian spaces underneath. However, as each of the new buildings are on average either taller or more bulky than the surrounding existing buildings and will occupy a site that is currently largely vacant, it is to be expected that some areas will be made windier than they currently are, and some areas more sheltered.

Taken overall, there is a small but identifiable deterioration in the overall mean wind conditions. The most significant area of deterioration was identified along the north side of Gaunt Street, increasing to a maximum at the southeast corner of Building 1 (location 35). At this location the gust speed is also increased above the 25m/s Safety Criterion.

7.4 ASSESSMENT OF DESIGN – UNITARY PLAN

The Auckland Unitary Plan wind standards are based on two separate criteria, these being the probability of occurrence of mean wind speeds (Category A to Category E), and the maximum annual gust wind speed (safety criteria). The measured wind tunnel data shows that there are four locations where the development affects the wind conditions and the wind standards are not met, given the current or intended use of the space:

(1) Location 19 (Amey Daldy Park) – Category A is anticipated. Development increases wind conditions from Category A to Category B. Pedestrians are unlikely to notice this change as existing wind conditions in Amey Daldy Park, including around its perimeter, range from Category A to Category C.

(2) Location 35 (Gaunt Street) – Category C is anticipated. Development increases wind conditions from Category A to Category D. It also increases the gust speed above the 25m/s Safety threshold. Pedestrians will find this area very windy at times. It will be noticeably more windy than other parts of the surrounding area.

(3) Location 48 (Lane 4 off Gaunt Street) – Category C is anticipated. Development creates Category D wind conditions. Pedestrians will notice that this is, at times, very windy.

(4) Location 58 (Mid-block plaza) – Category B is anticipated. Development creates Category C wind conditions. Pedestrians may notice that this is a windier part of the plaza space.

7.5 DEVELOPMENT STAGING AND WIND MITIGATION

The results of the wind tunnel study identify four locations where either the increases in mean wind speed or the maximum gust speed suggest that wind mitigation is appropriate. However, the wind tunnel results describe the pedestrian wind environment expected with the inclusion of all five of the development buildings. As noted in Section 2, the proposed development is to be staged over 10 years, with Building 1 to be completed first, and the other buildings over the remaining time. In this intervening 10-year period, wind conditions are likely to fall between the existing and new configurations that have been measured in this study. Accordingly, a wind mitigation strategy will be developed to address these four locations, focusing on the specific design features of Buildings 2 through 5, the landscaping along the north side of Gaunt Street adjacent to the three buildings (B1, B4 and B5), and the landscaping in and around the northeast section of Amey Daldy Park.

8 CONCLUSIONS

The following conclusions have been drawn from a wind tunnel study to determine the effects of the proposed development for 100 Halsey Street on wind conditions likely to be experienced by pedestrians in the vicinity.

1. Existing wind conditions around the development site are mostly Category A and B, with localised areas of Category C, and two locations with Category D conditions.
2. Wind conditions around the proposed development are also mostly Category A and B, with localised areas of Category C, and three locations with Category D conditions.
3. Increases and reductions in wind conditions were identified. However, taken overall, the proposed development does represent a slight deterioration in the local wind environment. This deterioration occurs in both the mean and gust wind speeds.
4. The resulting wind conditions with the development are mostly acceptable for the expected uses of the areas in which they occur. However, there are localised areas where existing horizontal wind flows are channelled along the streets, where they combine with vertical wind flows deflected down the windward sides of the new buildings to create windier regions.
5. There are four locations where either Unitary Plan mean wind speed or gust wind speed criteria are not met, given the current or intended use of the space. These include (a) Location 19 in Amey Daldy Park, (b) Location 35 at the southeast corner of Building 1 in Gaunt Street, (c) Location 48 in Lane 4 off Gaunt Street, and (d) Location 58 in the Mid-block plaza.
6. The development reduces the number of locations exceeding the 25 m/s Unitary Plan safety criterion from 10 to 5. However, there is one location around the proposed development's southeast corner where the gust speed is increased above 25m/s threshold.
7. The staging of the development means that wind speeds may differ from those reported until all five buildings are completed. A wind mitigation strategy will be developed to target the locations where the proposed development increases either the mean or gust wind speed over the Unitary Plan standards. This strategy will focus on the design of Buildings 2 through 5, as well as the landscaping along the north side of Gaunt Street and in the northeast section of Amey Daldy Park
8. Wind conditions on the Building 3 rooftop terraces, without additional wind protection, will be higher than considered appropriate for the intended use of these spaces. During the windiest of times access to the rooftop terraces should be controlled.

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9 LIMITATIONS

This report ('Report') has been prepared by WSP New Zealand Limited ('WSP') exclusively for NZCRE 100 Halsey Limited ('Client') in relation to the wind tunnel study of the proposed 100 Halsey Street development, for the Wynyard Quarter, Auckland, ('Purpose') and in accordance with the Short Form Agreement with the Client dated 9th August 2026 ('Agreement'). The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any use or reliance on this Report, in whole or in part, for any purpose other than the Purpose or for any use or reliance on this Report by any third party.

In preparing this Report, WSP has relied upon data, surveys, analyses, designs, plans and other information ('Client Data') provided by or on behalf of the Client. Except as otherwise stated in this Report, WSP has not verified the accuracy or completeness of the Client Data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in this Report are based in whole or part on the Client Data, those conclusions are contingent upon the accuracy and completeness of the Client Data. WSP will not be liable for any incorrect conclusions or findings in the Report should any Client Data be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

APPENDIX A UNITARY PLAN WIND RULES

BUSINESS – CITY CENTRE

The Auckland Unitary Plan (Operative in part (updated 11 September 2026)) contains policies and standards relating to wind effect created by buildings in different zones of the city. Reproduced below are the relevant sections of Chapter H9 of the Unitary Plan.

H8.3. Policies

General policies for all centres, Business – Mixed Use Zone, Business – General Business Zone and Business – Business Park Zone

(11) Require development to avoid, remedy or mitigate adverse wind and glare effects on public open spaces, including streets, and shading effects on open space zoned land.

H8.6. Standards

All activities listed as permitted, controlled or restricted discretionary in Table H8.4.1 Activity table must comply with the following standards.

H8.6.28. Wind

Purpose: mitigate the adverse wind effects generated by high-rise buildings.

(1) A new building and additions to existing buildings that increase the height of any part of the building must not cause:

(a) the mean wind speed around it to exceed the category for the intended use of the area as set out in Table H8.6.28.1 and Figure H8.6.28.1 Wind environment control;

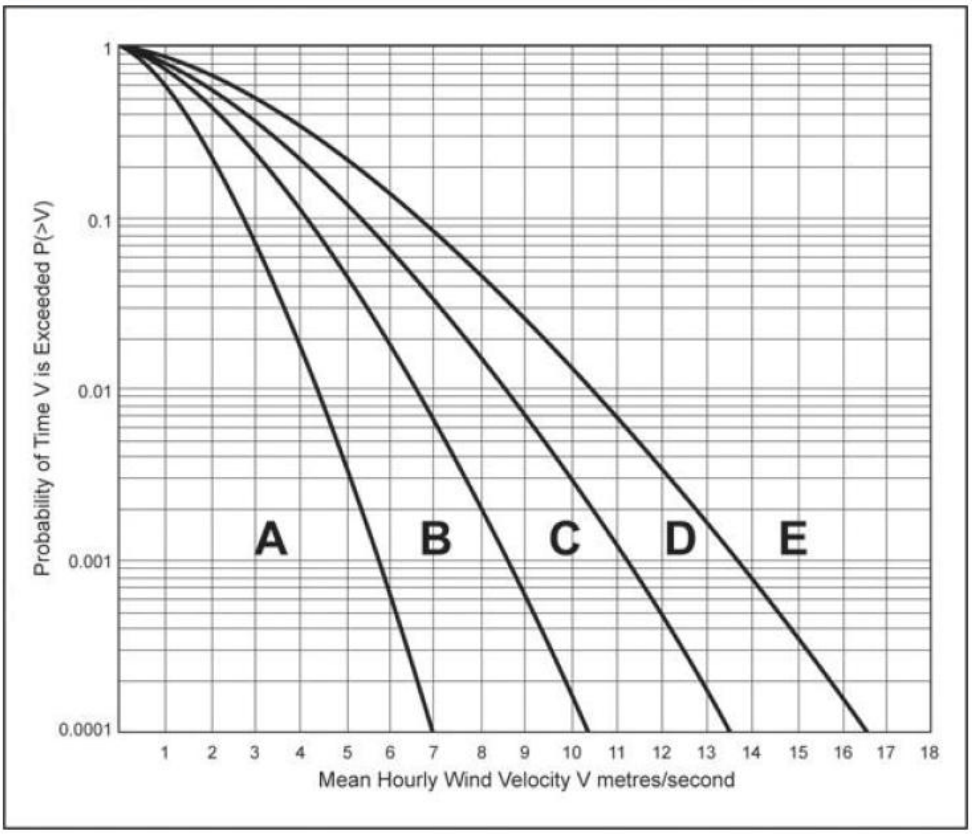
(b) the average annual maximum peak 3 second gust to exceed the dangerous level of 25m per second; and

(c) an existing wind speed which exceeds the controls of Standard H8.6.28(1)(a) or Standard H8.6.28(1)(b) above to increase.

Table H8.6.28.1 Performance categories

Cateory	Description
Category A	Areas of pedestrian use containing significant formal elements and features intended to encourage longer term recreational or relaxation use, such as. major and minor public squares, parks and other open spaces, including. Aotea Square, Queen Elizabeth Square, Albert Park, Myers Park, St Patrick's Square, and Freyberg Place
Category B	Areas of pedestrian use containing minor elements and features intended to encourage short-term recreation or relaxation, such as minor pedestrian open spaces, pleasance areas in road reserves, streets with significant groupings of landscaped seating features, including Khartoum Place, Mayoral Drive pleasance areas, and Queen Street
Category C	Areas of formed footpath or open space pedestrian linkages, used primarily for pedestrian transit and devoid of significant or repeated recreational or relaxational features, such as footpaths where not covered in categories A or B above
Category D	Areas of road, carriage way, or vehicular routes, used primarily for vehicular transit and open storage, such as roads generally where devoid of any features or form which would include the spaces in categories A - C above
Category E	Represents conditions which are dangerous to the elderly and infants and of considerable cumulative discomfort to others. Category E conditions are unacceptable and are not allocated to any physically defined areas of the city
Note: All through-site links and other private land given over to public use as bonus features, or subject to public access easements, must be subject to the wind environmental categories.	

Figure H9.6.9.1 Wind environment control



Derivation of the wind environment control graph:

The curves on the graph delineating the boundaries between the acceptable categories (A-D) and unacceptable (E) categories of wind performance are described by the Weibull expression:

$P(>V) = e^{-(v/c)^k}$

where V is a selected value on the horizontal axis, and P is the corresponding value of the vertical axis:

and where:

P(>V) = Probability of a wind speed V being exceeded;

e = The Napierian base 2.7182818285

v = the velocity selected;

k = the constant 1.5; and

c = a variable dependent on the boundary being defined:

A/B, c = 1.548

B/C, c = 2.322

C/D, c = 3.017

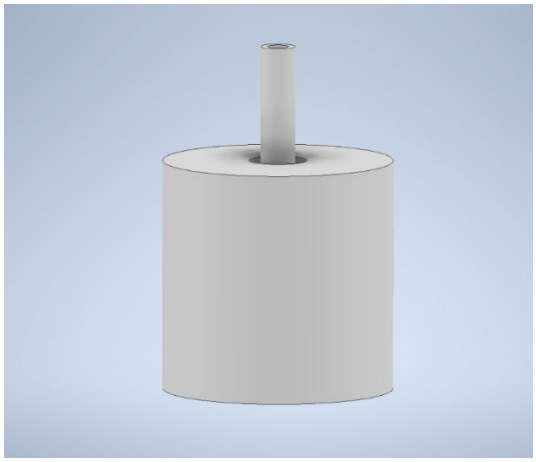
D/E, c = 3.715

APPENDIX B IRWIN PROBES

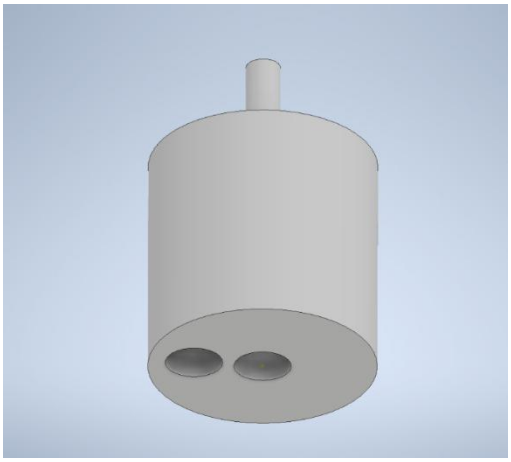
IRWIN PROBE DESCRIPTION

Irwin probes are omni-directional wind speed sensors widely used in wind tunnel testing for the measurement of pedestrian level wind conditions. These utilise the measurement of pressure differences between two points, one at the surface of the model and the other at the top of a central tube, the height of which is chosen to be representative of the height of a person.

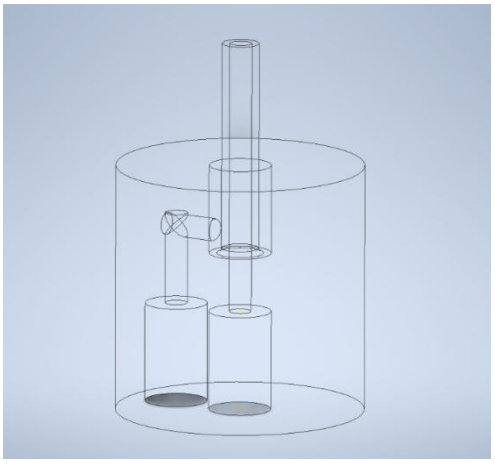
Figure B1 shows views of the Irwin probe design used at WSP Research. This shows a vertical central tube with an external diameter of 1.5mm, an internal diameter of 0.9mm and a height of 5mm above the probe body (1.5m @ 1:300 scale). This tube connects directly through to the 2.5mm diameter central hole on the base of the 10mm diameter probe. The central hole in the top of the probe body is 2.5mm in diameter and with the central tube forms an annulus, which connects through to the 2.5mm diameter off centre hole in the base of the probe. Figure B1 also shows a wireframe drawing of the probe and a view of a 3D printed Irwin probe.



(a) Oblique view (top)



(b) Oblique view - bottom



(c) Wire-frame view – bottom



(d) 3D printed probe

Figure B1: Views of Irwin probe

MEASUREMENT SYSTEM AND DATA COLLECTION

Each Irwin probe is connected to two pressure sensors of a Surrey Instruments 256-channel pressure measurement system using 1.5m lengths of urethane tubing. This allows differential pressures for each sensor to be measured, from which wind speeds can be calculated.

In addition to the Irwin probes, two of the pressure sensors are connected to a reference pitot-static tube that is positioned forward of the wind tunnel turntable. The differential pressure data from this pitot-static tube, when converted to wind speed provides a reference wind tunnel speed that can be related to full-scale meteorological data for each wind direction.

Data from all the Irwin probes is collected at 1000Hz simultaneously for a period of 60s. This is equivalent to a full-scale time of at least 3 hours.

DATA ANALYSIS

The collected Irwin probe pressure data is zeroed, differenced, digitally filtered and corrected for tubing length and diameter distortions. Pressure time histories are produced, as well as summary pressure statistics (mean, RMS, maximum and minimum). Calibration factors for the Irwin probes are applied, together with the measured air density, to produce wind speed time histories and summary wind speed statistics for each Irwin probe for each wind direction and model configuration tested.

WIND SPEED ANALYSIS

The directional wind speeds measured in the wind tunnel are converted to full-scale pedestrian-level wind speeds using full-scale meteorological data and the ratio of wind speeds measured at a scale height corresponding to 1.5m (pedestrian level) and 150m (reference height). The full-scale mean wind speeds are equalled or exceeded for 50 hours per year for each 10° sector centre on the specified direction.

For each location, the directional mean speeds are combined using a directional probability analysis to produce a single non-directional mean wind speed that is equalled or exceeded for 50 hours per year for. Similarly, the directional gust speeds are combined using a directional probability analysis to produce a non-directional calculated gust speed that corresponds to the maximum 3-second gust that is expected during the hour with the highest mean wind speed each year, which is compatible with the gust speed specified in the Auckland Unitary Plan safety criterion.

APPENDIX C AUCKLAND WIND CLIMATE

PREVAILING WINDS

Across the Auckland region, strong winds blow mostly from the northerly through easterly and southwesterly through westerly sectors. Typically, the strongest winds occur from the southwest sector. These southwesterly winds also tend to be noticed more because of the lower temperatures that often accompany them. Northerly through easterly wind directions can also play a significant role, particularly for sites closer to Auckland Harbour where the exposure to direct wind flows becomes greater.

REFERENCE WIND SPEEDS

Wind speed and direction data for Auckland for the period 2007-2025 was analysed to determine wind speed distributions for each 10° sector over the full 0° - 360° range of wind directions. Weibull distributions were fitted to the meteorological data, which was used to derive 10°-sector reference wind speeds for a height of 10m in Terrain Category 2. These were converted to site reference wind speeds at a scale height of 150m, considering the upstream terrain and topography using the analysis in AS/NZS 1170.2:2021 and employed in the Checkwind (V8.3.2) site-specific wind analysis software. These reference site wind speeds are listed in Table C1 and plotted in Figure C1.

Table C1 Site reference wind speeds

Wind Direction (deg)	Reference Wind Speed (m/s)	Wind Direction (deg)	Reference Wind Speed (m/s)
10	9.9	190	5.8
20	11.2	200	8.5
30	12.1	210	11.3
40	11.5	220	13.2
50	10.8	230	13.8
60	11.3	240	13.4
70	10.3	250	13.0
80	6.7	260	13.0
90	3.8	270	11.1
100	4.4	280	10.1
110	3.7	290	9.3
120	5.4	300	8.4
130	6.1	310	8.9
140	6.0	320	7.1
150	4.8	330	6.6
160	4.6	340	6.2
170	4.6	350	5.9
180	4.7	360	7.0

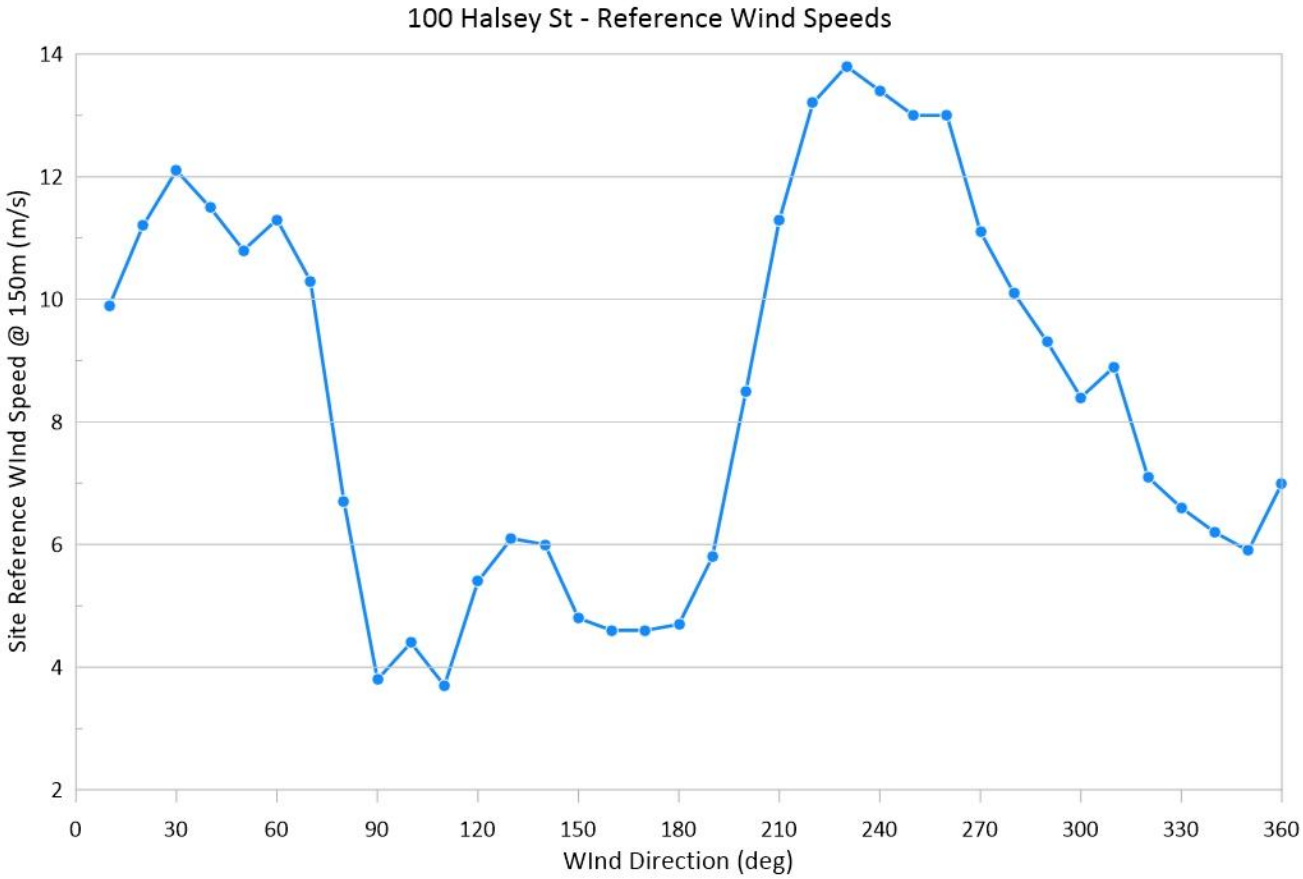


Figure C1: Site reference wind speeds – 100 Halsey Street

APPENDIX D WIND TUNNEL AND BOUNDARY LAYER

The WSP Research and Innovation Centre wind tunnel is a recirculating type, with an overall length of approximately 30 m. The working section measures 3.0 m wide x 1.5 m high. The airflow is generated by a six blade, 2.0 m diameter, 45 kW axial flow fan in the upper circular section of the wind tunnel. The maximum air speed in the working section is around 15m/s. A variable speed drive controls the air speed. Figure D1 shows a view of the wind tunnel.

The section of the wind tunnel upwind of the turntable allows the development of a deep turbulent boundary layer to simulate the natural atmospheric boundary layer at an appropriate scale. The correct velocity and turbulence profiles are typically generated by vertical spires, horizontal fence elements and an array of wooden blocks on the floor of the tunnel.

The Deaves and Harris (1978) mathematical model of the structure of strong winds is recognised as the recommended model for engineering design purposes. It is used in the wind loading design Standard, AS/NZS 1170.2. The four main terrain categories defined in AS/NZS 1170.2 are:

Terrain Categories

1 Flat, treeless plains, sea coasts
2 Open terrain, well scattered obstructions (air fields)
3 Suburban, industrial and well wooded areas
4 City centre condition



Figure D1: WSP Research and Innovation Centre Wind Tunnel.

Figure D2 compares examples of the mean velocity and turbulence intensity profiles from the wind tunnel with the Deaves and Harris mathematical model for approach flow over the wind tunnel simulation of Terrain Category 3, which has a roughness length of z_0 = 0.2m. Figure D3 shows a plot of the streamwise turbulence spectrum obtained in the wind tunnel at a height of 500mm above the wind tunnel floor. This plot also includes a scaled plot of the empirical Harris-von Karman spectra for comparison.

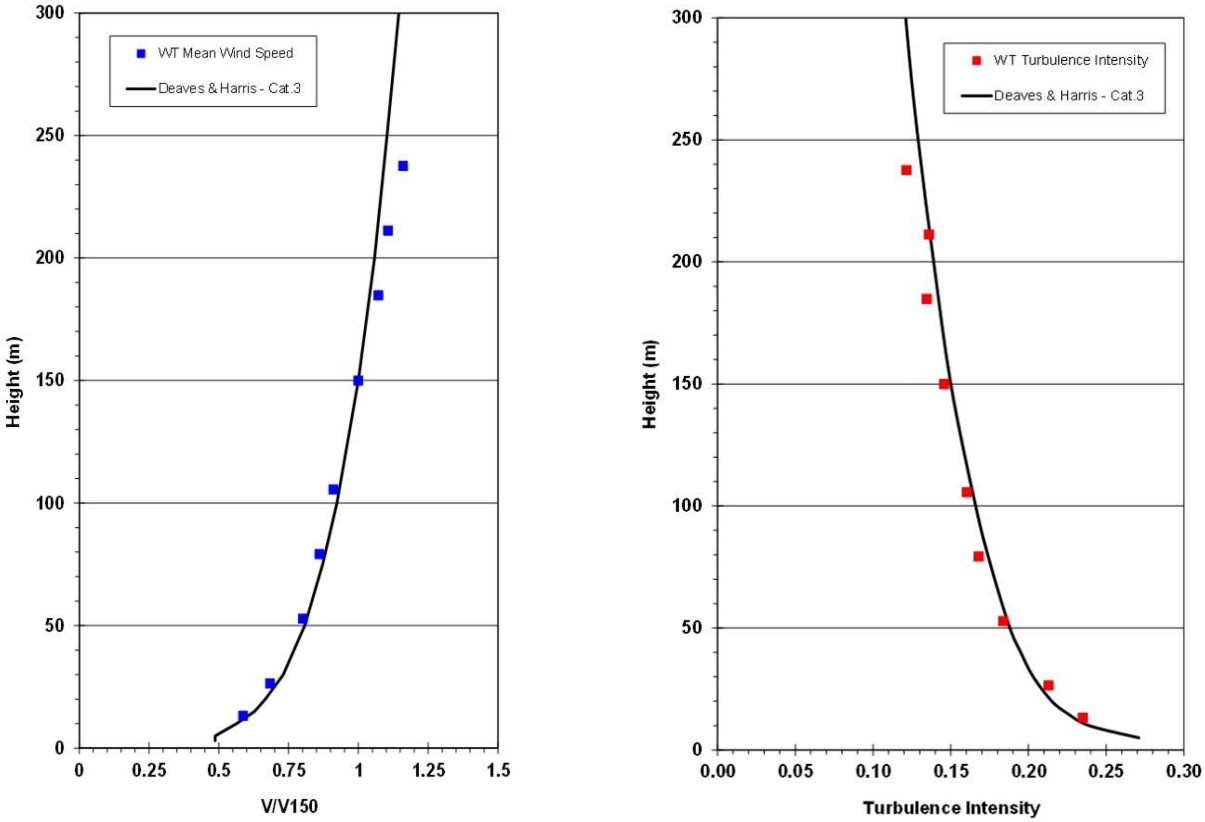


Figure D2: Mean velocity and turbulence intensity profiles for 1:300 boundary layer simulation

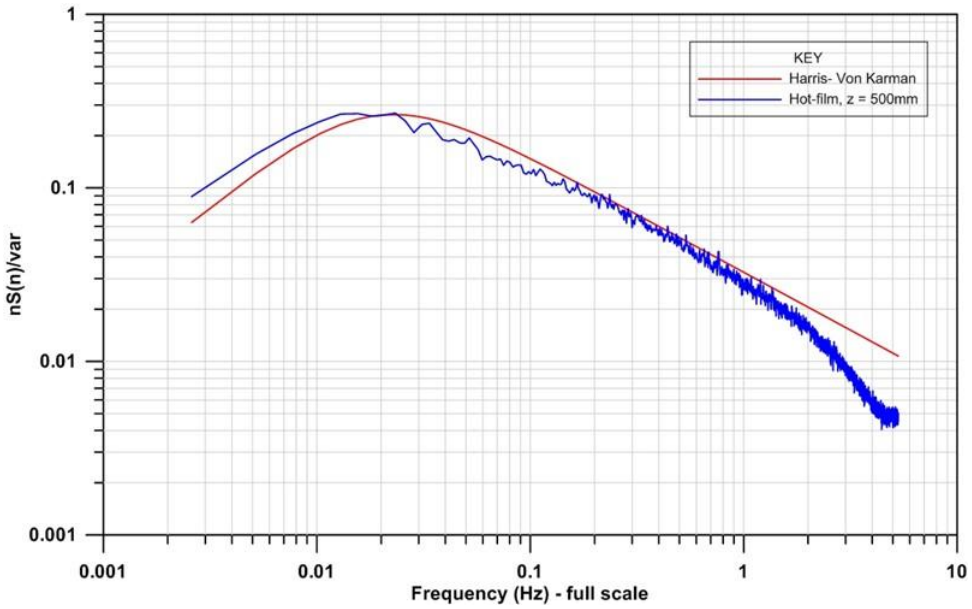


Figure D3: Streamwise turbulence spectra for the 1:300 boundary layer simulation

APPENDIX E DIRECTIONAL WIND SPEEDS

Table E1 lists the mean wind speeds in m/s at each location, at a height of 1.5m, which are equalled or exceeded for 50 hours per year for wind directions within a 10-degree sector centred on the specified direction. The table is split into four sections of 90 degrees for legibility.

Table E2 lists the 3-second gust wind speeds in m/s at each location, at a height of 1.5m, which are equalled or exceeded once per year for wind directions within a 10-degree sector centred on the specified direction. The table is split into four sections of 90 degrees for legibility.

Table E1: Directional Mean Wind Speeds (equalled or exceeded for 50 hours/year) – m/s

Note: Exg = Existing situation, New = proposed development, - = not measured

Location	10		20		30		40		50		60		70		80		90	
	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New
1	2.8	2.6	2.9	2.6	3.1	3.0	2.7	2.4	2.5	2.4	3.2	3.2	2.4	2.5	1.4	1.5	0.7	0.8
2	2.6	2.6	2.7	3.0	2.3	2.4	1.7	2.1	1.8	2.1	2.1	2.3	1.6	1.7	1.1	1.0	0.7	0.7
3	2.2	2.6	2.8	3.1	2.8	3.1	2.6	3.5	4.3	3.8	5.4	4.8	4.0	3.9	2.2	2.2	1.0	1.5
4	2.0	3.1	2.6	3.4	3.6	2.8	3.3	2.8	2.4	2.4	2.0	2.5	2.6	3.5	1.8	2.3	0.9	1.7
5	2.5	1.7	3.2	2.2	4.5	3.4	3.9	3.3	3.1	2.7	3.3	3.1	3.6	3.7	2.4	2.3	1.4	1.5
6	1.5	1.3	1.9	1.6	2.8	2.2	2.5	2.1	1.9	1.7	2.3	2.2	2.7	2.9	1.8	1.7	1.0	1.2
7	1.6	1.6	2.1	2.0	2.9	2.5	2.8	2.4	2.3	2.1	2.9	2.6	3.0	3.0	2.0	1.7	1.1	1.1
8	3.2	2.2	3.6	2.4	2.9	2.5	1.8	1.7	2.8	2.7	3.5	3.3	2.4	2.3	1.1	1.1	0.5	0.6
9	1.4	1.1	1.5	1.4	1.7	2.1	1.8	2.6	1.4	2.3	1.5	2.2	1.6	2.8	1.2	1.7	0.6	1.1
10	4.1	3.9	3.9	3.7	4.2	4.1	3.4	3.4	2.9	2.9	3.5	3.5	3.3	3.6	1.7	2.0	0.9	1.0
11	2.5	1.8	2.1	1.8	2.2	2.0	1.9	2.2	2.9	2.9	3.6	3.8	2.3	2.3	1.2	1.3	0.7	0.8
12	1.9	2.6	2.3	3.3	2.8	3.7	2.7	4.6	3.5	5.0	3.8	5.6	3.8	5.0	2.2	3.0	1.0	1.8
13	1.9	3.4	2.7	3.7	3.8	2.7	3.6	2.6	2.9	2.2	2.6	1.7	2.9	1.6	1.8	1.0	1.2	0.7
14	1.8	2.0	2.8	2.3	3.8	2.2	3.8	1.9	3.6	1.9	3.9	2.4	3.2	3.1	2.0	1.9	1.4	1.2
15	2.1	1.5	2.9	2.0	4.2	2.9	3.8	2.8	3.0	2.4	3.2	2.7	3.8	3.7	2.6	2.3	1.6	1.6
16	1.9	1.5	2.4	2.0	3.3	2.8	3.1	2.6	2.4	2.0	2.7	2.5	3.1	3.1	2.0	1.8	1.1	1.2
17	1.6	1.5	2.0	1.9	2.7	2.2	2.6	2.4	2.2	2.1	2.8	2.8	3.2	3.2	2.0	1.9	1.1	1.2
18	3.3	3.3	3.4	3.5	3.9	4.0	3.2	3.4	2.9	3.5	4.2	4.6	4.2	4.5	1.8	2.2	0.9	0.9
19	2.8	2.3	2.7	2.3	2.8	2.8	2.4	2.7	3.1	4.2	4.0	5.0	2.3	2.9	1.0	1.6	0.8	1.0
20	2.0	1.3	1.8	1.5	1.9	1.7	1.9	1.9	2.9	2.0	3.4	2.7	2.7	2.6	1.4	1.7	0.9	0.9
21	3.3	3.6	3.2	3.9	3.5	4.4	3.0	4.2	3.5	5.5	4.4	6.2	2.6	4.4	1.3	1.4	1.2	0.9
22	2.2	1.3	1.8	1.3	1.7	1.5	1.7	1.5	2.4	1.5	2.9	1.7	2.0	1.5	1.4	1.0	1.2	0.6
23	2.5	2.9	3.0	3.4	3.5	3.8	3.0	3.6	3.4	4.4	4.8	5.5	3.8	4.3	1.7	2.2	1.1	1.2
24	3.0	2.9	3.0	3.1	3.2	3.5	2.7	3.5	3.3	5.1	4.3	6.0	2.7	4.3	1.6	2.2	1.2	1.0
25	2.2	2.4	1.9	2.6	1.9	2.6	1.8	2.4	2.1	2.5	2.5	2.9	1.9	2.0	2.0	1.2	1.4	0.8
26	1.8	2.4	2.8	3.4	3.2	3.9	3.2	4.5	4.7	6.3	6.9	7.9	4.4	5.7	1.7	2.8	1.1	1.5
27	2.4	4.4	2.1	4.8	2.1	5.3	2.1	5.4	2.1	4.7	2.6	4.6	2.4	5.1	2.4	3.2	1.3	1.4
28	3.0	2.5	3.7	3.4	4.1	4.2	4.2	4.9	5.4	6.8	7.2	8.1	4.8	5.8	2.9	3.0	1.8	1.7
29	3.3	2.9	3.8	3.0	3.7	2.8	4.2	2.5	3.5	2.9	3.6	3.4	4.4	2.6	3.3	1.5	1.3	0.9
30	2.1	3.0	2.0	3.1	2.0	3.0	1.9	2.8	2.0	3.0	2.2	3.3	1.9	2.6	1.5	1.4	0.6	0.7
31	2.6	3.6	3.2	3.9	3.2	3.9	4.0	3.8	3.2	4.2	3.0	4.3	3.7	3.3	2.3	1.4	0.8	0.6
32	2.9	2.1	3.0	2.4	2.6	2.7	3.2	2.6	3.2	2.2	2.6	2.2	2.3	1.8	1.6	1.5	0.7	1.1
33	2.4	2.6	2.7	3.3	2.9	4.2	2.7	4.7	2.7	4.0	3.6	3.8	3.5	3.6	1.6	2.0	0.9	1.2
34	1.8	1.3	2.1	1.6	2.4	2.0	2.7	2.2	3.0	2.3	3.6	2.8	3.0	2.6	1.5	1.4	0.9	0.8
35	1.6	2.3	1.9	3.3	2.3	4.3	2.4	4.7	2.6	5.6	3.0	7.6	2.4	7.8	1.2	4.3	0.7	2.4
36	1.6	1.8	1.8	2.0	2.1	2.4	2.0	3.1	1.9	3.7	1.9	4.5	2.0	4.3	1.4	2.2	0.6	1.4
37	3.3	3.5	3.6	4.2	3.3	4.2	4.0	4.4	3.3	5.0	3.0	5.3	3.3	3.9	1.9	1.7	0.6	0.9
38	3.7	3.4	4.3	3.4	4.0	3.4	4.5	3.4	4.5	3.9	3.6	4.1	2.7	2.0	1.7	1.4	1.0	1.1
39	3.0	2.3	3.5	2.6	3.8	2.8	3.7	3.1	3.8	3.3	4.7	4.0	4.2	4.5	2.0	2.4	1.0	1.2
40	2.8	2.0	3.5	2.7	4.2	3.2	4.7	3.5	5.2	4.5	5.8	6.0	4.5	5.9	2.2	3.2	1.0	1.7
41	2.6	1.4	3.2	1.8	3.6	2.3	4.2	2.7	4.4	4.0	4.3	5.6	2.9	5.6	1.5	2.7	0.8	1.6
42	2.2	2.3	2.8	3.4	3.3	3.8	3.0	3.7	3.0	3.6	4.0	4.5	4.2	4.4	2.5	2.8	1.5	1.3
43	1.9	1.4	2.7	1.7	3.5	2.1	4.0	2.1	3.5	2.1	3.1	2.1	3.9	1.9	2.4	1.7	1.1	1.2
44	3.4	1.1	4.1	1.4	4.5	1.9	4.3	2.3	4.1	2.5	4.6	3.0	3.8	2.8	1.9	1.6	0.8	0.9
45	2.6	2.3	3.0	2.4	3.0	2.3	2.9	2.3	2.6	2.1	2.8	2.1	2.3	2.2	1.2	1.4	0.7	0.9
46	3.3	2.6	4.3	3.8	5.3	5.0	5.4	5.8	5.3	6.8	5.3	7.5	3.6	6.8	1.6	3.8	1.0	2.2
47	-	3.5	-	3.9	-	4.2	-	4.0	-	3.5	-	3.6	-	2.4	-	0.9	-	0.6
48	2.5	3.4	2.9	3.8	3.1	4.2	3.1	4.7	2.6	4.2	2.6	4.3	2.8	4.8	1.4	2.9	0.8	1.6
49	1.8	2.5	1.7	2.4	1.8	2.3	1.8	1.9	1.8	1.6	2.1	1.8	2.4	2.1	2.5	1.9	1.2	1.5
50	1.8	2.8	1.9	2.5	2.0	2.7	2.1	3.6	2.0	3.7	2.2	4.0	2.8	4.8	2.4	2.7	1.0	1.8
51	2.4	1.3	2.7	1.7	2.8	2.6	3.4	3.1	3.3	2.8	3.2	2.8	3.1	3.0	1.9	1.7	1.0	1.1
52	1.4	1.8	1.7	1.9	1.9	1.7	2.0	1.6	1.8	1.6	1.8	2.1	1.5	2.4	0.9	1.4	0.5	1.0
53	1.5	1.8	1.9	1.9	2.4	2.1	2.6	2.0	2.2	2.2	2.2	2.5	1.7	2.8	1.4	1.7	1.2	1.1
54	2.1	1.8	2.6	2.2	3.1	2.9	3.4	3.5	3.2	3.7	3.1	4.0	3.2	3.6	2.7	2.1	1.3	1.4
55	1.7	2.2	2.2	3.0	3.0	4.4	3.0	4.4	2.7	4.2	3.0	4.5	3.0	4.3	2.6	2.7	1.4	2.0
56	2.2	1.6	2.7	1.8	3.2	2.2	3.3	2.6	3.0	3.0	3.1	3.4	3.2	3.4	2.0	1.8	1.0	1.2
57	1.2	2.8	1.3	3.6	1.5	5.0	1.4	4.6	1.4	4.1	1.7	4.6	2.0	3.8	1.4	1.9	0.8	1.1
58	1.7	1.3	2.2	1.5	2.8	1.6	2.8	1.9	2.7	2.6	2.9	3.7	3.2	2.9	2.3	1.5	1.1	1.0
59	1.9	2.1	2.2	2.1	2.6	2.4	2.8	2.9	2.6	2.7	2.5	2.6	3.0	2.4	1.5	1.4	0.9	0.9
60	1.4	3.1	1.6	3.1	1.9	3.2	2.0	3.6	2.4	2.8	3.9	2.3	4.1	2.2	1.7	1.3	0.9	0.6
61	1.4	2.1	1.4	2.2	1.6	2.7	1.7	2.4	1.6	2.2	1.6	3.0	1.9	3.2	1.4	1.9	0.8	1.2
62	1.1	1.0	1.5	1.3	1.9	1.5	1.8	1.5	2.0	1.8	3.3	2.8	3.8	3.1	2.4	1.7	1.2	1.1
63	2.1	3.8	3.1	3.2	4.3	3.6	4.1	3.0	4.0	2.4	5.8	3.4	7.0	3.8	4.8	2.1	2.4	1.3
64	1.1	2.0	1.2	1.7	1.4	1.9	1.4	1.8	1.8	1.7	2.7	2.4	2.8	2.5	1.8	1.5	1.0	0.9
65	2.7	2.7	4.0	3.6	5.1	4.1	5.5	4.2	4.7	3.8	4.4	4.0	3.8	4.1	1.9	2.2	1.2	1.3
66	1.3	1.6	1.5	2.2	1.9	2.9	1.8	2.9	2.4	3.4	4.3	4.9	3.7	4.8	1.5	2.5	0.9	1.4
67	1.3	1.7	1.3	1.9	1.6	2.6	1.5	2.9	1.5	3.5	1.9	4.9	1.9	4.8	1.0	2.5	0.5	1.5
68	1.8	1.4	2.1	1.5	2.2	1.7	2.0	1.8	1.9	1.6	2.1	1.7	2.6	2.4	1.4	1.6	0.8	0.8
69	2.3	1.8	3.3	2.5	4.3	3.3	4.6	3.3	4.6	3.7	6.0	5.0	6.8	4.9	4.0	2.7	2.0	1.6
70	4.0	4.2	5.2	4.7	5.5	4.6	6.3	4.3	5.9	4.7	6.1	5.2	6.1	3.8	4.1	1.8	1.7	0.8
71	-	2.4	-	2.7	-	3.0	-	4.0	-	4.3	-	3.7	-	2.8	-	1.7	-	1.1
72	-	2.7	-	3.1	-	3.6	-	4.9	-	5.4	-	5.4	-	4.7	-	3.0	-	1.9
73	-	3.0	-	3.3	-	3.4	-	4.3	-	4.7	-	4.5	-	3.9	-	2.6	-	1.7
74	-	3.2	-	3.0	-	3.0	-	3.8	-	3.9	-	3.1	-	2.4	-	1.5	-	1.0
75	-	1.9	-	2.0	-	2.4	-	3.5	-	3.8	-	3.3	-	3.5	-	2.4	-	1.7
76	-	3.8	-	4.6	-	4.9	-	5.8	-	5.4	-	4.7	-	4.7	-	2.9	-	1.8
77	-	5.0	-	5.6	-	5.9	-	6.0	-	5.1	-	5.1	-	5.5	-	3.4	-	2.2
78	-	3.1	-	3.3	-	3.5	-	3.5	-	3.2	-	3.1	-	2.8	-	1.7	-	1.0
79	-	5.8	-	5.0	-	4.3	-	4.3	-	3.6	-	3.1	-	2.8	-	1.5	-	1.0
80	-	2.5	-	4.4	-	6.3	-	8.7	-	8.0	-	6.2	-	5.0	-	2.9	-	1.8

Table E1: Directional Mean Wind Speeds (equalled or exceeded for 50 hours/year) – m/s

Note: Exg = Existing situation, New = proposed development, - = not measured

Location	100		110		120		130		140		150		160		170		180	
	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New
1	1.0	0.9	1.3	0.7	2.3	1.5	2.4	1.8	2.5	1.9	2.0	1.5	1.9	1.4	1.8	1.3	1.8	1.2
2	0.9	0.8	0.7	0.7	1.2	1.1	1.6	1.2	1.7	1.4	1.4	1.1	1.4	1.0	1.4	1.1	1.5	1.1
3	1.1	1.3	0.7	1.2	1.4	1.7	1.8	2.0	1.9	2.3	1.3	1.5	1.1	1.1	1.0	0.9	1.2	0.9
4	1.0	1.5	0.7	1.3	1.1	1.8	1.2	1.8	1.4	1.9	1.1	1.4	1.1	1.4	1.3	1.2	1.4	0.9
5	1.6	1.4	1.2	1.3	2.1	1.9	2.3	2.2	2.3	2.5	1.9	1.9	1.7	1.7	1.3	1.7	1.2	1.5
6	1.0	0.9	0.7	0.8	1.1	1.3	1.3	1.6	1.4	1.7	1.1	1.2	1.1	1.4	1.4	1.4	1.3	1.3
7	1.4	1.1	1.0	1.2	1.7	1.4	1.6	1.6	1.6	1.7	1.1	1.2	1.0	1.0	0.9	1.0	0.8	1.1
8	0.6	0.6	0.5	0.5	1.0	0.9	1.2	0.9	1.1	1.0	0.9	0.7	1.1	0.5	1.4	0.5	1.8	0.7
9	0.6	1.0	0.6	0.9	1.1	1.4	1.7	1.6	2.0	1.8	1.6	1.3	1.3	0.9	1.0	0.8	1.2	0.7
10	1.3	1.3	1.4	0.9	2.4	1.9	2.3	2.3	2.5	2.2	2.2	1.8	1.9	1.7	1.8	1.5	1.6	1.1
11	0.8	0.8	0.7	0.9	1.2	1.0	1.6	1.1	1.7	1.3	1.3	0.9	1.3	0.9	1.2	1.1	1.2	1.0
12	1.1	1.5	0.7	0.9	1.1	1.2	1.4	1.4	1.5	1.6	1.1	1.2	1.0	1.1	0.9	0.8	0.9	0.7
13	1.4	0.7	0.7	0.6	1.1	0.7	1.2	0.8	1.3	0.9	1.0	0.8	0.9	0.9	0.8	0.9	0.8	0.8
14	1.7	1.4	1.2	1.2	2.0	1.7	2.1	1.8	2.1	1.7	1.6	1.3	1.4	1.2	1.1	1.2	0.9	1.1
15	1.9	1.3	1.1	1.1	1.7	1.4	1.5	1.3	1.4	1.4	1.0	0.9	0.8	0.8	0.7	0.7	0.8	0.7
16	1.2	0.9	0.7	0.8	1.2	1.0	1.1	1.1	1.0	1.1	0.7	0.8	0.7	0.8	0.7	0.8	0.9	0.8
17	1.2	1.0	0.8	0.9	1.4	1.5	1.7	1.9	1.8	2.0	1.3	1.4	1.2	1.5	1.2	1.4	0.9	1.4
18	1.1	1.2	0.7	1.0	1.0	1.6	1.3	1.6	1.9	1.7	1.7	1.5	1.5	1.6	1.4	1.5	1.3	1.2
19	1.0	1.0	0.9	0.7	1.5	1.3	1.7	1.3	1.8	1.5	1.4	1.3	1.3	1.3	1.2	1.4	1.2	1.4
20	1.1	0.7	1.0	0.5	1.6	0.7	1.5	0.7	1.5	0.7	1.2	0.6	1.3	0.7	1.3	0.6	1.2	0.7
21	1.4	0.9	0.9	0.7	1.4	1.2	1.5	1.4	1.6	1.4	1.2	1.2	1.1	1.4	1.1	1.6	1.0	1.4
22	1.4	0.5	1.0	0.5	1.7	0.9	1.8	1.0	1.7	1.0	1.3	0.8	1.4	0.8	1.3	0.8	1.2	0.7
23	1.1	1.3	0.8	1.0	1.2	2.0	1.8	2.0	2.4	2.2	2.0	2.0	1.8	1.9	1.6	1.7	1.6	1.5
24	1.3	0.7	0.8	0.7	1.3	1.1	1.4	1.2	1.5	1.4	1.2	1.2	1.1	1.5	1.0	1.8	1.0	1.7
25	1.4	0.8	1.0	0.5	1.6	0.8	1.7	0.9	1.5	0.9	1.1	0.7	1.0	0.8	0.9	1.1	0.9	1.4
26	1.5	1.5	1.3	1.0	1.7	1.9	2.0	1.9	2.3	2.0	2.0	1.7	1.7	1.5	1.4	1.5	1.4	1.5
27	1.4	0.7	0.9	0.5	1.4	1.0	1.4	1.2	1.2	1.2	0.9	1.1	0.8	1.2	0.8	1.0	0.8	1.1
28	2.3	1.4	1.7	0.6	2.3	1.1	2.3	1.4	2.7	1.4	2.0	1.3	1.6	1.3	1.5	1.3	1.7	1.4
29	1.4	0.8	1.0	0.6	1.4	1.2	1.6	1.4	1.9	1.5	1.5	1.6	1.2	1.9	1.2	1.6	1.4	1.6
30	0.7	0.6	0.5	0.5	0.8	0.8	0.9	0.9	1.1	0.9	0.9	0.8	0.7	0.8	0.6	0.9	0.6	1.1
31	0.7	0.9	0.6	1.0	0.9	2.0	1.0	2.5	1.3	2.6	1.0	2.4	0.8	2.6	0.7	2.4	0.7	2.4
32	0.8	1.5	0.8	1.4	1.1	2.2	1.3	2.4	1.5	2.4	1.1	2.0	1.0	2.1	1.2	1.9	1.2	2.0
33	1.0	0.9	0.8	0.7	1.2	0.9	1.1	1.0	1.3	1.0	1.0	1.0	1.0	1.4	1.0	1.3	0.9	1.4
34	1.0	0.9	0.9	0.7	1.4	1.0	1.3	1.1	1.0	1.0	0.7	0.8	0.8	1.2	0.7	1.2	0.7	1.3
35	0.8	2.3	0.8	1.9	1.2	2.0	1.4	1.8	1.3	1.6	0.8	1.0	0.9	1.4	0.9	1.6	1.0	1.8
36	0.6	1.2	0.5	1.1	0.8	1.3	1.0	1.2	1.2	1.2	0.9	0.8	0.8	0.9	0.8	1.0	0.8	1.4
37	0.6	0.6	0.4	0.5	0.7	1.0	0.8	1.2	0.9	1.4	0.8	1.6	0.7	2.0	0.7	1.9	0.7	2.1
38	1.2	1.6	1.2	1.4	1.7	2.2	2.3	2.5	2.8	2.5	2.0	1.9	1.7	1.9	1.6	1.6	1.4	1.6
39	1.0	1.4	0.8	1.2	1.2	1.6	1.3	1.6	1.5	1.5	1.2	1.2	1.1	1.6	1.1	1.5	1.0	1.6
40	1.0	1.7	0.8	1.4	1.2	1.8	0.9	1.7	1.0	1.5	0.7	1.2	0.7	1.6	0.7	1.5	0.7	1.7
41	0.9	1.5	0.6	1.2	0.8	1.4	0.9	1.2	0.9	1.0	0.6	0.9	0.7	1.3	0.9	1.2	1.0	1.3
42	1.4	1.6	0.8	1.3	1.2	1.8	1.0	1.7	1.0	1.5	0.8	1.0	0.7	1.1	0.6	0.9	0.6	0.9
43	1.2	1.4	1.1	1.1	1.4	1.6	2.2	1.9	2.4	1.8	1.7	1.4	1.4	1.2	1.2	1.0	1.3	1.0
44	0.8	0.9	0.8	0.7	1.1	1.0	1.7	1.2	2.0	1.2	1.4	1.0	1.2	1.3	1.3	1.1	1.3	1.2
45	0.7	0.9	0.5	0.7	0.7	0.8	1.0	0.9	1.2	0.8	1.0	0.9	0.9	1.0	0.9	1.1	0.9	1.2
46	1.1	1.7	0.9	1.4	1.4	1.6	1.3	1.5	1.6	1.5	1.4	1.0	1.4	0.8	1.3	0.6	1.2	0.7
47	-	1.0	-	0.9	-	1.7	-	2.3	-	2.3	-	2.3	-	2.5	-	2.5	-	2.7
48	0.9	1.5	0.7	1.2	1.1	1.0	1.2	0.9	1.2	1.1	1.0	1.3	1.0	1.8	1.0	1.8	0.9	2.0
49	1.2	1.4	0.9	1.2	1.4	1.7	1.5	2.0	1.3	1.9	0.9	1.5	0.9	1.6	0.9	1.3	0.8	1.1
50	1.0	1.5	0.8	1.2	1.4	1.5	1.5	1.5	1.4	1.5	1.0	1.2	1.1	1.3	1.1	1.4	1.0	1.6
51	1.1	0.9	1.1	0.8	1.8	1.2	2.0	1.3	1.9	1.3	1.4	0.8	1.5	0.7	1.4	0.8	1.4	0.8
52	0.6	0.9	0.5	0.8	0.8	1.1	0.9	1.1	1.0	1.1	0.7	0.7	0.7	0.7	0.8	0.8	0.9	0.9
53	1.5	0.9	1.2	0.8	1.9	1.0	2.1	0.9	2.1	0.9	1.5	0.7	1.6	0.9	1.7	1.1	1.7	1.2
54	1.4	1.1	1.1	0.8	1.9	1.0	2.2	1.0	2.1	1.0	1.4	0.9	1.5	1.0	1.5	1.1	1.4	1.1
55	1.5	1.3	1.2	1.0	2.1	1.4	2.3	1.3	2.3	1.3	1.5	0.9	1.6	1.1	1.8	1.2	1.8	1.4
56	1.1	0.9	1.0	0.7	1.8	1.0	1.9	1.1	1.7	1.2	1.2	1.6	1.2	2.2	1.1	2.3	1.0	2.5
57	0.9	1.0	0.8	0.8	1.5	1.0	1.7	1.2	1.8	1.3	1.2	1.0	1.2	1.2	1.3	1.2	1.3	1.0
58	1.2	0.7	1.1	0.6	1.8	1.0	1.8	1.1	1.7	1.0	1.2	0.7	1.1	0.6	1.2	0.5	1.1	0.7
59	1.0	1.3	0.8	1.2	1.4	1.9	1.4	2.2	1.3	2.2	1.0	1.4	1.0	1.6	0.8	1.5	0.8	1.3
60	1.0	1.2	0.7	1.1	1.2	1.7	1.1	1.9	1.0	1.9	0.8	1.2	0.7	1.3	0.7	1.2	0.7	1.2
61	1.0	1.2	0.9	1.0	1.5	1.6	1.4	2.1	1.3	2.2	0.9	1.6	0.9	1.8	1.0	1.8	1.1	1.6
62	1.3	0.9	0.8	0.7	1.3	1.2	1.4	1.2	1.5	1.3	1.0	0.9	0.9	0.7	0.8	0.6	0.7	0.6
63	2.5	1.2	1.4	1.0	2.2	1.6	1.7	1.9	1.5	1.9	1.0	1.4	1.0	1.6	1.1	1.6	1.2	1.5
64	1.1	0.9	1.2	0.8	2.0	1.3	2.0	1.4	1.7	1.5	1.1	1.0	0.8	1.0	0.8	0.9	0.8	0.8
65	1.3	1.3	1.1	1.1	1.7	1.7	1.6	1.9	1.3	1.9	0.9	1.2	0.8	1.2	0.7	1.1	0.8	1.0
66	1.0	1.1	0.7	0.9	1.1	1.2	1.0	1.3	0.9	1.2	0.6	0.8	0.6	0.8	0.6	0.8	0.7	0.9
67	0.6	1.4	0.4	1.2	0.7	1.4	0.7	1.2	0.8	1.2	0.6	0.7	0.5	0.9	0.5	0.8	0.6	0.9
68	1.0	0.8	0.8	0.6	1.3	0.8	1.5	1.1	1.9	1.1	1.4	1.2	1.2	1.5	1.2	1.6	1.1	1.7
69	2.1	1.5	1.4	1.3	2.2	1.7	1.9	1.9	1.6	1.9	0.9	1.3	0.8	1.4	0.9	1.3	0.9	1.3
70	1.6	0.9	1.2	0.5	1.4	0.8	1.4	1.0	1.5	1.1	1.1	1.2	0.8	1.4	0.9	1.2	1.1	1.3
71	-	0.9	-	0.7	-	1.0	-	1.1	-	1.1	-	0.7	-	0.7	-	0.7	-	0.7
72	-	1.9	-	1.5	-	2.1	-	2.1	-	2.0	-	1.1	-	0.9	-	0.7	-	0.7
73	-	1.8	-	1.5	-	2.2	-	2.4	-	2.4	-	1.4	-	1.0	-	0.7	-	0.6
74	-	1.1	-	1.0	-	1.5	-	1.7	-	1.9	-	1.5	-	1.4	-	1.0	-	0.8
75	-	2.0	-	1.8	-	2.5	-	2.4	-	2.4	-	1.8	-	1.6	-	1.2	-	0.9
76	-	1.6	-	1.3	-	2.0	-	2.5	-	2.6	-	2.0	-	2.0	-	1.4	-	1.0
77	-	2.0	-	1.7	-	2.1	-	2.1	-	2.1	-	1.3	-	0.9	-	0.6	-	0.6
78	-	1.4	-	1.4	-	2.0	-	2.0	-	1.7	-	1.0	-	1.0	-	1.2	-	1.4
79	-	1.1	-	1.0	-	1.2	-	1.2	-	1.1	-	0.8	-	0.8	-	1.1	-	1.4
80	-	2.0	-	1.8	-	2.5	-	2.8	-	2.6	-	1.7	-	1.4	-	1.0	-	0.8

Table E1: Directional Mean Wind Speeds (equalled or exceeded for 50 hours/year) – m/s

Note: Exg = Existing situation, New = proposed development, - = not measured

Location	190		200		210		220		230		240		250		260		270	
	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New
1	1.9	1.3	2.4	1.7	3.2	2.3	3.4	3.1	4.6	3.8	4.0	3.6	3.4	3.6	3.5	3.3	3.2	2.8
2	1.8	1.2	2.4	1.8	2.8	2.5	2.7	3.0	3.0	2.8	2.9	2.4	3.4	2.6	3.6	2.4	3.6	2.3
3	1.6	1.5	2.4	2.2	3.2	3.1	3.5	4.5	4.1	5.5	3.5	5.4	2.8	5.6	2.8	5.3	2.3	4.3
4	1.8	1.3	2.6	2.0	3.3	2.4	4.0	3.6	5.0	4.8	4.5	4.7	3.1	4.7	3.6	5.0	2.5	3.9
5	1.9	0.9	3.2	1.1	4.6	1.4	5.3	2.1	6.1	2.4	6.0	2.2	5.3	2.4	4.6	2.7	3.8	2.0
6	2.0	1.2	3.8	1.6	5.4	1.5	5.7	1.7	4.5	2.3	4.0	2.5	3.4	3.0	3.2	3.1	2.8	2.0
7	1.4	1.3	2.7	1.9	3.9	2.1	4.2	2.4	3.9	1.8	3.7	1.7	3.2	2.2	2.8	2.6	2.6	1.7
8	2.5	1.1	3.3	1.8	4.2	2.7	4.9	3.7	6.7	5.2	5.7	5.0	3.3	4.6	3.0	3.7	1.6	2.4
9	1.7	0.6	2.7	0.9	3.6	1.3	4.0	1.8	3.3	2.2	2.8	2.5	2.6	2.8	2.8	2.8	2.3	1.8
10	1.4	1.1	1.8	1.5	2.5	2.3	3.1	3.1	3.7	3.2	3.6	2.7	2.7	2.6	2.9	2.6	2.9	2.4
11	1.6	1.2	1.9	1.7	2.4	2.3	2.4	2.6	3.3	2.5	3.3	2.3	3.1	2.3	2.8	2.3	2.3	1.9
12	1.1	1.2	1.6	1.9	2.2	2.7	2.5	4.0	3.9	5.7	3.4	6.1	2.7	6.9	3.2	6.7	2.8	5.5
13	1.0	0.8	1.7	1.2	2.4	1.6	2.9	2.1	3.5	2.7	3.1	2.7	2.4	2.7	3.0	2.5	2.6	2.0
14	1.3	0.8	2.2	1.2	3.9	2.2	4.9	3.2	5.2	3.6	4.8	3.5	4.6	3.6	4.1	3.2	3.1	2.0
15	1.3	0.7	2.0	1.2	2.6	1.8	3.0	2.7	3.2	3.6	3.0	4.0	2.7	4.1	3.0	3.8	2.6	2.6
16	1.5	0.8	2.6	1.2	3.7	1.7	4.3	2.3	3.8	3.2	3.3	3.4	2.8	3.6	2.8	3.4	2.5	2.1
17	1.1	1.2	1.9	1.5	3.1	1.6	3.5	2.0	3.2	2.7	2.9	3.0	2.6	3.0	2.5	2.8	2.3	1.8
18	1.1	1.1	1.4	1.4	1.9	1.9	2.5	2.7	3.1	3.3	2.4	3.1	1.7	3.2	1.7	2.7	1.6	1.9
19	1.4	1.9	1.7	2.8	2.0	4.1	2.2	4.4	2.4	4.0	2.5	3.6	2.3	3.6	2.4	3.3	2.4	2.5
20	1.5	1.0	2.0	1.7	2.0	2.1	2.1	2.6	2.4	3.7	2.4	4.0	2.3	4.7	2.5	4.8	2.1	4.0
21	1.2	1.6	1.8	2.4	2.4	3.9	2.9	4.8	2.5	4.8	2.1	4.1	1.6	4.0	1.6	3.7	1.6	3.0
22	1.5	0.9	2.1	1.4	2.3	1.9	2.4	2.1	2.7	2.6	2.4	2.6	2.2	3.1	2.0	3.3	1.8	2.9
23	2.1	2.1	3.9	3.5	6.2	6.1	7.4	7.4	7.9	7.6	5.9	5.1	4.2	4.3	4.1	3.7	2.9	2.8
24	1.2	2.0	2.4	2.8	4.0	4.1	4.9	5.1	5.1	5.4	3.9	4.7	2.9	4.6	2.8	4.0	2.0	3.3
25	1.2	2.2	1.8	3.2	2.8	4.6	3.7	5.5	4.5	5.8	3.8	5.2	3.3	5.1	2.9	4.5	2.1	3.6
26	1.4	1.6	2.0	2.2	2.9	2.8	3.3	3.7	3.9	4.0	3.6	3.4	3.2	3.0	3.0	3.0	2.4	2.6
27	0.9	1.6	1.6	2.4	2.7	3.2	3.3	4.0	4.4	5.0	4.4	4.7	4.1	4.6	3.5	4.2	2.4	3.2
28	2.2	1.9	3.9	3.2	6.3	5.4	7.0	7.0	8.3	7.9	7.7	7.1	6.6	6.3	5.6	5.3	4.4	3.8
29	1.9	1.9	3.8	2.7	6.7	4.3	7.1	6.0	8.3	7.1	7.5	6.3	6.7	5.8	6.0	5.1	4.5	3.7
30	0.8	1.8	1.5	2.5	2.5	3.2	2.9	3.7	3.5	4.0	3.2	3.6	3.0	3.2	2.5	2.9	1.9	2.2
31	1.0	2.6	1.6	3.3	2.8	4.1	3.0	4.3	3.3	4.5	3.0	4.1	2.8	4.1	2.7	3.8	2.2	3.1
32	1.5	2.2	2.2	3.1	2.7	4.1	3.2	4.4	3.3	4.1	3.3	3.7	2.8	3.1	2.5	2.8	1.9	2.1
33	1.2	1.9	1.8	2.9	2.9	4.1	3.8	5.3	4.0	6.2	4.1	6.0	4.5	5.4	5.0	5.1	4.5	4.2
34	0.9	1.8	1.2	2.9	1.6	3.9	2.0	5.1	2.3	6.3	2.6	6.2	2.9	5.8	3.0	5.5	2.2	4.4
35	1.2	2.9	1.6	4.8	1.7	6.7	2.3	7.6	2.4	7.5	2.5	7.2	2.4	6.8	2.6	6.3	2.0	4.2
36	0.9	1.8	1.4	2.6	2.0	3.4	2.7	3.9	3.1	4.1	3.5	4.0	3.6	4.0	4.0	3.7	2.9	2.4
37	0.8	2.6	1.4	3.7	2.1	5.0	2.5	5.2	2.9	4.2	2.9	3.6	2.8	2.9	2.5	2.5	1.9	1.9
38	1.8	1.8	2.1	2.6	1.9	4.4	2.1	5.5	2.3	5.5	2.3	4.9	2.3	4.1	2.3	3.6	1.9	2.4
39	1.4	2.0	2.1	2.8	3.0	3.9	3.7	5.2	3.4	6.0	3.6	5.4	4.2	4.3	5.1	3.5	5.1	3.3
40	0.9	1.9	1.4	2.7	2.5	3.2	3.5	4.1	4.4	4.8	5.0	5.0	5.1	5.0	5.2	5.2	4.3	4.1
41	1.2	1.8	1.4	2.8	1.4	2.8	1.7	2.5	2.2	2.0	2.6	2.0	2.7	2.0	2.5	1.9	2.2	1.6
42	0.8	1.3	1.2	2.2	2.6	3.9	4.3	5.0	5.2	5.1	5.0	5.3	3.7	4.2	3.1	3.8	2.6	3.0
43	1.8	1.0	2.0	1.3	1.8	1.8	2.1	2.3	2.0	2.5	2.1	2.3	2.4	1.8	2.8	1.8	2.5	1.8
44	1.7	1.2	2.6	1.6	3.4	2.4	4.1	3.3	3.6	4.1	3.6	3.7	4.4	3.1	5.7	3.2	6.0	4.6
45	1.0	1.3	1.5	1.7	2.6	2.1	3.3	2.6	3.9	3.2	4.2	3.2	4.3	3.4	4.7	3.8	4.5	4.2
46	1.3	0.7	1.7	1.1	2.1	1.6	2.7	2.2	3.8	3.1	4.5	3.9	4.5	4.2	4.5	4.6	3.5	4.0
47	-	3.3	-	4.7	-	6.2	-	6.7	-	6.2	-	5.6	-	4.5	-	3.4	-	2.0
48	1.1	2.7	1.7	4.1	2.7	5.9	3.4	7.5	3.9	8.6	4.0	8.4	4.2	7.7	4.2	6.8	3.5	4.2
49	1.1	1.1	1.4	1.4	1.9	2.2	2.4	2.9	3.5	3.3	3.4	3.0	3.4	3.1	3.1	3.1	2.2	2.9
50	1.3	2.1	1.8	3.0	2.0	4.0	2.3	4.4	2.3	4.4	2.2	4.2	2.2	3.8	2.2	3.6	1.8	3.0
51	1.8	0.9	2.6	1.3	3.3	2.3	3.6	3.2	3.1	3.6	2.8	3.5	2.3	3.8	2.1	4.2	1.8	3.9
52	1.2	1.0	2.0	1.4	3.1	1.6	3.9	2.3	3.5	2.4	3.0	2.5	2.9	2.8	2.9	2.5	2.2	1.5
53	2.3	1.3	3.2	1.9	4.2	2.1	5.0	2.0	4.2	2.0	3.5	2.0	2.6	2.3	2.4	1.9	2.4	1.4
54	1.7	1.1	2.3	1.6	2.6	2.3	3.1	3.1	2.8	3.2	2.5	3.2	2.3	2.9	2.3	2.6	2.1	2.0
55	2.2	2.0	2.7	2.9	3.1	2.8	3.7	2.6	3.3	2.8	2.8	2.4	2.6	2.3	2.6	2.1	2.5	1.5
56	1.3	2.9	1.8	3.8	2.3	3.7	2.8	4.1	3.0	4.4	3.0	4.2	2.8	4.4	2.7	4.5	2.4	3.8
57	1.6	1.1	2.2	1.6	2.9	2.7	3.4	3.5	3.3	3.9	2.9	3.8	2.7	3.5	2.6	3.3	2.1	2.5
58	1.4	1.0	1.9	1.7	2.2	4.4	2.6	6.3	2.9	7.0	2.9	6.9	2.9	6.0	3.0	5.2	2.8	3.6
59	1.0	1.3	1.4	1.7	2.1	1.9	2.7	2.8	3.6	2.9	3.8	3.1	3.9	3.4	3.9	4.0	3.2	3.5
60	0.9	1.2	1.3	1.6	1.9	1.9	2.4	2.1	3.3	2.1	3.9	2.4	4.0	2.5	4.0	2.8	3.0	2.3
61	1.5	1.1	2.2	1.1	3.3	1.6	4.1	2.0	4.1	2.0	3.4	1.9	2.9	1.6	2.8	1.4	2.2	1.1
62	0.7	0.6	1.0	0.8	1.5	1.1	1.9	1.3	2.1	1.4	2.1	1.5	1.9	1.6	1.8	1.6	1.6	1.2
63	1.8	1.6	3.0	2.2	4.5	2.2	5.8	2.0	6.3	1.7	5.8	1.6	4.9	1.6	4.4	1.6	3.0	1.2
64	1.1	0.9	1.8	1.6	2.8	2.6	3.7	3.0	4.0	2.7	4.1	2.5	4.3	2.2	4.2	2.0	3.2	1.2
65	1.1	1.3	1.9	2.2	3.4	3.7	4.7	5.1	5.1	5.5	5.2	5.5	5.4	5.1	5.7	4.5	4.4	2.3
66	0.9	1.2	1.3	1.9	1.8	3.1	2.4	3.4	2.4	2.5	2.5	2.2	2.6	2.0	2.7	1.9	2.4	1.2
67	0.8	1.6	1.2	2.9	1.8	5.0	2.4	6.7	2.4	7.6	2.4	7.6	2.5	7.6	2.9	6.7	2.7	3.5
68	1.7	2.1	2.4	3.1	2.9	4.0	3.3	4.5	2.9	5.0	2.8	4.7	2.8	3.5	2.9	2.8	2.6	2.1
69	1.3	1.5	2.0	2.3	2.7	2.8	3.6	2.9	3.8	2.1	3.9	1.9	3.8	1.7	3.8	1.8	2.9	1.3
70	1.6	1.7	3.2	2.6	5.1	3.4	5.5	4.2	6.5	5.1	6.1	4.8	5.7	4.8	5.4	4.5	4.0	3.4
71	-	1.2	-	2.3	-	3.4	-	3.3	-	3.1	-	3.4	-	4.1	-	4.2	-	3.5
72	-	1.3	-	2.7	-	4.2	-	3.8	-	3.7	-	4.1	-	5.6	-	5.5	-	4.3
73	-	0.8	-	1.2	-	1.8	-	2.1	-	2.4	-	2.8	-	4.1	-	4.3	-	3.5
74	-	0.7	-	1.1	-	1.9	-	2.4	-	2.5	-	2.3	-	2.9	-	3.8	-	3.4
75	-	0.8	-	1.1	-	1.7	-	2.1	-	2.3	-	2.2	-	2.2	-	2.0	-	1.5
76	-	1.3	-	2.2	-	3.8	-	5.0	-	5.3	-	4.3	-	2.9	-	2.9	-	3.4
77	-	0.6	-	1.0	-	1.5	-	1.9	-	2.1	-	2.1	-	2.7	-	3.5	-	3.4
78	-	2.4	-	4.2	-	6.7	-	7.9	-	7.1	-	6.2	-	6.7	-	6.3	-	4.8
79	-	2.2	-	3.6	-	5.5	-	6.0	-	5.4	-	4.7	-	4.9	-	5.2	-	4.5
80	-	0.9	-	1.6	-	3.0	-	4.3	-	5.5	-	5.4	-	4.1	-	2.7	-	1.7

Table E1: Directional Mean Wind Speeds (equalled or exceeded for 50 hours/year) – m/s

Note: Exg = Existing situation, New = proposed development, - = not measured

Location	280		290		300		310		320		330		340		350		360	
	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New
1	3.0	2.6	2.6	2.3	2.1	2.1	2.5	2.5	2.1	1.9	2.0	1.9	2.1	2.0	2.2	2.0	2.6	2.3
2	3.4	2.5	3.2	2.4	2.4	1.9	2.9	2.3	2.8	2.5	2.9	2.6	2.6	2.3	2.1	1.7	1.9	1.7
3	2.3	3.8	2.1	3.6	1.7	2.5	2.3	2.1	1.9	1.4	1.6	1.3	1.4	1.1	1.4	1.0	1.7	1.5
4	2.3	3.0	2.1	2.7	2.4	2.4	4.0	3.1	3.5	2.9	2.5	2.1	1.9	1.6	1.7	1.4	1.8	1.8
5	3.5	1.6	3.1	1.6	1.6	1.4	1.6	1.4	2.0	1.4	2.0	1.3	1.4	1.3	1.1	1.3	1.6	1.4
6	2.3	1.5	1.9	1.4	1.0	1.2	1.4	1.2	1.6	1.2	1.6	1.3	1.0	1.2	0.8	1.2	1.1	1.2
7	2.1	1.4	1.7	1.4	1.2	1.2	2.2	1.6	2.7	2.2	2.3	2.1	1.3	1.9	1.1	1.6	1.3	1.4
8	1.3	1.7	1.5	1.3	2.3	1.6	3.3	2.5	2.8	2.1	2.4	1.6	2.1	1.3	2.2	1.4	2.6	1.7
9	1.9	1.9	2.4	2.8	2.6	2.6	3.1	2.8	2.2	2.1	1.5	1.4	1.2	1.1	1.2	1.0	1.3	1.1
10	2.7	2.2	2.9	2.5	3.1	2.9	3.4	3.4	2.8	2.7	2.8	2.7	2.8	2.7	2.9	2.7	3.5	3.2
11	2.4	1.8	2.6	2.1	2.4	2.5	2.6	2.7	2.0	1.7	1.9	1.6	1.8	1.6	1.7	1.5	2.2	1.7
12	3.1	4.4	3.2	3.9	2.4	3.1	2.5	3.3	2.1	2.1	2.1	2.2	1.8	1.9	1.7	1.4	1.7	1.6
13	2.6	1.8	2.6	2.0	1.8	2.1	1.7	1.9	1.4	1.6	1.5	1.3	1.4	1.1	1.2	1.2	1.3	2.1
14	3.2	2.2	3.5	2.7	2.6	2.9	3.2	3.5	2.6	3.1	1.9	2.2	1.5	1.7	1.1	1.4	1.1	1.5
15	2.3	2.8	2.0	3.4	1.5	3.2	1.9	3.2	1.6	2.3	1.4	1.9	1.1	1.4	0.9	1.2	1.3	1.2
16	2.1	2.1	1.6	2.5	1.1	2.3	1.6	2.1	1.9	1.8	1.8	1.7	1.1	1.5	1.1	1.4	1.4	1.3
17	2.0	1.7	1.4	1.8	1.1	1.6	2.1	1.8	2.5	2.0	1.7	1.9	0.9	1.6	0.9	1.2	1.1	1.2
18	1.5	1.8	1.7	1.8	1.8	1.6	2.1	2.0	1.9	2.0	2.2	2.3	2.4	2.6	2.8	2.8	3.2	2.9
19	2.4	2.1	2.3	2.0	2.0	1.7	2.2	2.0	1.9	1.7	2.1	1.8	2.1	1.8	2.0	1.7	2.4	1.9
20	2.0	3.1	2.0	2.4	2.0	1.9	2.5	1.9	2.1	1.5	2.1	1.6	1.9	1.4	1.8	1.0	1.8	1.0
21	1.5	2.8	1.4	3.0	1.2	2.4	1.5	2.4	1.8	2.3	2.2	2.5	2.4	2.5	2.4	2.4	2.8	2.8
22	1.7	2.5	1.6	2.2	1.7	2.1	2.6	2.5	2.4	1.8	2.5	2.1	2.4	1.8	2.1	1.3	2.1	1.1
23	2.7	2.5	3.3	3.0	3.8	3.5	4.1	3.9	2.6	2.3	1.8	1.6	1.8	1.8	1.6	1.8	1.8	2.2
24	1.9	3.2	1.8	3.3	2.1	2.1	2.2	2.0	1.6	1.4	1.6	1.7	2.0	2.0	2.1	2.0	2.4	2.3
25	1.9	3.4	1.9	3.7	1.9	2.4	1.7	2.3	1.5	2.2	1.8	2.7	1.8	2.4	1.8	1.9	2.0	1.8
26	2.3	2.5	2.0	1.8	1.8	1.6	2.0	1.6	1.6	1.0	1.3	1.1	0.9	1.0	0.9	1.1	1.1	1.5
27	2.1	3.0	2.4	3.4	2.2	2.6	1.6	2.8	1.1	2.9	1.4	3.5	1.7	3.6	1.8	3.1	2.0	3.2
28	3.9	3.4	4.0	3.5	3.8	3.1	3.5	2.6	2.3	1.7	1.7	1.7	1.5	1.6	1.7	1.5	2.1	1.7
29	4.1	3.4	4.6	4.0	4.7	4.1	4.5	3.5	2.8	1.7	1.6	2.1	1.5	2.0	1.8	1.9	2.2	2.0
30	1.8	2.0	2.2	2.7	1.9	2.0	1.4	1.6	0.9	1.5	1.1	1.7	1.3	2.0	1.5	2.1	1.7	2.4
31	1.9	2.9	2.0	3.6	1.7	2.9	1.7	2.5	1.2	2.0	1.1	2.2	1.2	2.4	1.3	2.4	1.7	2.7
32	1.8	2.1	1.7	2.8	1.5	2.2	1.5	1.7	1.0	1.2	1.0	1.1	1.4	1.2	1.8	1.2	2.2	1.4
33	3.8	3.7	2.6	3.1	2.2	2.0	2.1	1.7	1.1	0.9	1.1	0.9	1.3	1.2	1.5	1.3	1.8	1.7
34	2.1	3.7	2.2	3.1	2.5	1.8	2.3	1.6	1.2	0.8	1.0	0.7	1.0	0.7	1.1	0.8	1.3	0.9
35	1.9	3.1	1.9	2.8	1.9	2.0	1.8	1.6	1.1	0.8	1.5	0.7	1.5	0.9	1.3	1.1	1.4	1.5
36	2.6	2.3	3.0	2.2	2.6	2.2	1.9	2.0	1.4	0.9	2.1	0.8	1.7	0.9	1.4	0.9	1.4	1.2
37	1.7	1.7	1.8	1.8	1.7	1.5	1.7	1.5	1.1	1.6	1.0	1.7	1.1	1.8	1.5	1.9	2.0	2.3
38	1.9	2.3	1.8	2.9	1.8	2.8	1.8	2.7	1.2	1.9	1.0	2.1	1.5	2.4	2.2	2.4	2.6	2.6
39	4.6	3.4	2.7	2.5	1.6	1.7	1.7	1.9	1.1	1.1	1.0	1.1	1.1	1.1	1.5	1.2	2.0	1.5
40	3.5	3.4	2.4	2.6	2.6	2.2	2.7	1.8	1.5	1.1	1.2	1.0	1.5	1.0	1.7	1.1	2.0	1.4
41	2.2	1.8	1.7	1.9	1.5	2.2	1.6	2.4	1.0	1.0	1.4	0.7	1.8	0.7	1.8	0.9	2.1	1.1
42	3.0	3.2	2.7	3.2	2.4	2.6	2.1	2.3	1.2	1.1	1.6	0.8	1.7	1.2	1.6	1.7	1.7	2.0
43	2.5	1.8	1.8	1.6	1.4	1.5	1.4	1.4	0.9	0.9	0.8	0.8	0.9	0.9	1.0	0.9	1.3	0.8
44	5.7	4.9	3.8	3.2	1.8	2.0	1.9	2.1	1.2	1.2	1.0	1.0	1.2	1.0	1.6	0.9	2.2	1.0
45	4.1	3.9	3.0	3.0	2.4	2.6	2.3	2.4	1.4	1.4	1.0	1.0	1.2	0.9	1.5	0.9	1.9	1.4
46	2.7	3.5	2.0	2.7	1.7	2.1	1.6	2.0	1.0	1.0	1.8	0.8	2.1	1.0	2.1	1.2	2.4	1.7
47	-	1.7	-	1.7	-	1.3	-	1.2	-	1.0	-	1.2	-	1.8	-	2.0	-	2.4
48	2.8	3.3	2.2	2.6	2.2	1.7	1.7	1.3	1.4	1.0	1.6	1.5	1.8	2.0	1.9	2.1	1.9	2.5
49	1.8	2.4	1.8	2.3	1.7	2.2	1.4	2.4	1.3	1.9	1.5	2.1	1.6	2.0	1.5	1.8	1.6	1.8
50	1.6	2.7	1.7	3.1	1.4	2.8	1.4	3.4	1.3	3.0	1.4	3.3	1.3	3.1	1.3	2.6	1.4	2.3
51	1.7	3.5	2.1	3.2	1.5	1.8	1.6	1.8	1.7	1.8	1.8	2.0	1.7	1.6	1.6	1.2	1.8	1.0
52	2.3	1.3	2.5	1.3	2.0	1.4	2.5	1.9	2.6	1.9	2.2	1.3	1.5	1.2	1.1	1.1	1.1	1.4
53	2.8	1.2	3.3	1.2	2.6	1.1	2.5	1.3	2.7	1.5	2.7	1.0	2.3	0.9	1.6	0.9	1.3	1.3
54	2.3	1.7	2.6	1.6	2.2	1.3	2.3	1.5	2.4	1.3	2.6	1.0	2.4	1.0	1.9	1.0	1.7	1.4
55	2.9	1.4	3.2	1.5	2.6	1.4	2.0	1.3	1.5	1.0	1.9	1.2	2.1	1.4	1.7	1.4	1.5	1.7
56	2.4	3.2	2.7	2.9	2.0	1.9	2.0	1.7	1.9	1.2	2.1	1.4	2.1	1.7	1.8	1.6	1.8	1.4
57	1.9	2.0	1.7	1.7	1.4	1.2	1.1	1.1	0.9	1.1	1.0	1.4	1.0	1.6	0.8	1.7	0.9	2.2
58	2.8	2.8	2.9	2.2	2.2	1.5	1.6	1.7	1.1	1.4	1.3	1.2	1.4	1.2	1.2	1.0	1.3	1.1
59	2.6	2.7	2.4	1.8	2.0	1.0	1.7	1.0	1.4	1.2	1.6	1.4	1.6	1.7	1.4	1.6	1.5	1.7
60	2.4	1.7	2.6	1.4	2.4	0.9	1.8	0.9	1.1	1.1	1.1	1.5	1.1	1.9	1.0	2.0	1.1	2.3
61	1.8	1.0	1.5	0.9	1.1	0.8	1.1	0.9	1.0	0.9	1.0	1.1	1.0	1.2	0.9	1.3	1.0	1.7
62	1.5	1.1	1.3	1.2	0.9	1.1	1.6	1.3	1.4	1.2	0.9	1.0	0.7	0.8	0.7	0.7	0.8	0.8
63	2.3	1.0	2.2	1.0	1.6	0.9	1.3	1.0	1.3	1.3	1.1	2.3	1.1	2.7	1.1	2.8	1.3	3.3
64	2.5	1.0	2.6	0.9	2.5	0.8	1.5	0.9	1.0	1.0	1.0	1.3	0.9	1.5	0.8	1.5	0.9	1.7
65	3.4	1.5	3.6	1.3	3.2	0.9	2.0	0.9	1.2	1.1	1.7	1.7	1.5	2.0	1.3	1.9	1.5	2.1
66	2.0	1.1	1.8	1.1	1.8	1.1	1.4	1.1	0.9	0.6	1.1	0.7	1.2	0.8	1.0	0.8	1.0	1.1
67	2.3	2.4	2.1	2.2	2.1	1.2	1.6	0.9	0.9	0.7	1.1	1.1	1.1	1.2	0.9	1.1	1.0	1.2
68	2.5	2.0	2.7	2.1	2.4	1.3	2.0	1.4	1.0	1.0	0.9	1.0	1.0	0.9	1.0	0.8	1.2	1.0
69	2.3	1.1	2.2	1.0	2.0	1.0	1.5	0.9	1.1	0.8	1.5	0.9	1.4	1.0	1.2	1.0	1.3	1.3
70	3.7	3.4	4.0	3.8	4.1	3.9	4.6	4.0	3.4	1.9	2.2	2.3	1.3	2.5	1.7	2.5	2.3	2.8
71	-	2.9	-	2.9	-	2.6	-	2.7	-	2.3	-	2.4	-	2.0	-	1.6	-	1.6
72	-	3.3	-	2.8	-	2.4	-	2.6	-	2.2	-	2.3	-	2.0	-	1.5	-	1.7
73	-	2.8	-	3.2	-	3.8	-	3.7	-	2.9	-	2.8	-	2.4	-	1.9	-	2.0
74	-	3.0	-	3.6	-	3.9	-	3.5	-	2.9	-	2.9	-	2.6	-	2.3	-	2.5
75	-	1.2	-	1.2	-	1.0	-	1.2	-	1.0	-	0.8	-	1.0	-	1.1	-	1.3
76	-	3.2	-	3.4	-	3.0	-	3.0	-	2.0	-	1.9	-	2.1	-	2.1	-	2.6
77	-	2.8	-	2.7	-	2.8	-	3.4	-	3.0	-	3.1	-	3.1	-	2.9	-	3.4
78	-	3.8	-	3.0	-	2.5	-	2.7	-	2.4	-	2.8	-	2.8	-	2.3	-	2.3
79	-	3.7	-	3.0	-	2.6	-	3.0	-	3.1	-	4.0	-	4.5	-	4.1	-	4.3
80	-	1.4	-	1.3	-	1.1	-	1.2	-	1.2	-	1.0	-	1.0	-	1.1	-	1.4

Table E2: Directional 3-second Gust Wind Speeds (equalled or exceeded once per year) – m/s

Note: Exg = Existing situation, New = proposed development, - = not measured

Location	10		20		30		40		50		60		70		80		90	
	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New
1	14.6	14.1	13.2	12.4	14.3	13.8	13.1	12.4	13.0	12.6	15.9	15.9	13.3	13.9	10.6	11.2	7.4	8.3
2	12.2	11.3	12.7	13.0	11.9	12.2	8.7	10.2	9.2	10.6	10.7	11.7	8.7	9.2	8.0	7.3	6.7	6.6
3	11.0	12.0	13.3	13.6	13.0	13.3	13.3	14.0	18.9	16.2	21.0	19.1	19.4	17.5	14.9	13.5	9.6	11.5
4	9.5	15.3	11.0	17.2	14.2	13.6	14.0	12.1	12.7	11.1	12.1	12.8	15.4	17.0	13.3	13.9	9.5	11.8
5	11.6	9.1	13.0	11.6	16.6	15.2	16.0	15.0	14.8	13.8	16.1	15.5	18.0	18.4	14.7	13.8	10.3	11.3
6	8.0	7.5	9.8	8.8	13.3	11.4	12.4	11.0	10.2	9.7	12.3	12.2	14.1	14.6	11.3	11.0	8.1	9.1
7	9.4	9.3	11.3	10.4	14.1	12.4	13.5	11.7	12.4	11.5	14.9	13.9	15.6	15.7	13.3	12.0	9.5	9.5
8	14.0	11.9	15.6	12.6	15.2	14.0	9.5	9.7	14.1	13.4	15.9	15.6	14.4	13.6	8.6	8.3	5.4	6.2
9	7.2	5.9	7.1	6.8	9.1	10.6	10.0	12.2	7.7	11.2	7.5	11.5	9.7	14.6	9.2	11.7	5.7	10.2
10	17.5	16.9	15.9	14.7	17.6	17.4	15.7	15.4	14.6	14.5	17.3	17.7	16.8	17.2	13.4	13.9	9.0	10.2
11	13.4	10.5	10.4	9.1	10.9	10.4	9.6	11.2	14.6	15.6	17.7	19.6	13.0	13.5	9.3	9.2	7.0	8.1
12	10.2	13.2	11.8	15.1	13.1	15.6	14.1	17.6	18.1	19.5	19.8	21.4	19.5	19.0	15.8	15.3	10.4	12.0
13	9.4	15.0	12.1	17.0	16.4	13.4	16.1	10.9	14.7	10.6	13.9	9.1	16.2	8.6	13.3	7.4	11.5	6.6
14	8.9	10.6	11.8	11.8	14.8	10.7	15.3	9.6	15.7	10.1	15.9	12.1	16.3	15.3	13.0	12.8	10.5	10.9
15	10.8	8.1	13.5	10.4	17.7	14.0	16.7	13.6	14.5	12.3	16.7	14.3	19.0	17.9	15.8	14.2	12.2	12.4
16	10.5	8.7	12.3	10.9	15.7	13.9	14.6	13.4	12.7	11.7	14.4	13.6	16.2	16.0	13.1	12.2	9.4	10.3
17	9.0	8.3	10.6	9.9	13.8	12.0	13.6	12.6	12.1	11.8	15.4	15.2	17.6	17.5	14.4	13.4	10.2	11.1
18	17.5	17.2	16.9	16.7	18.7	19.3	15.6	16.1	15.7	17.8	21.1	22.3	23.1	24.1	15.5	17.3	8.7	9.6
19	13.8	12.3	13.2	11.5	13.1	12.7	12.1	13.1	16.7	20.2	20.0	23.6	13.9	15.5	8.3	10.9	7.7	9.1
20	10.8	6.4	9.1	7.3	9.5	8.0	10.4	8.9	15.6	10.4	17.3	14.5	16.3	14.5	12.3	11.7	8.4	8.1
21	14.6	12.8	13.7	12.1	14.8	14.2	13.7	14.4	17.0	20.4	20.7	23.1	15.3	17.7	10.1	10.4	11.1	8.5
22	12.0	6.9	9.5	6.8	8.9	7.7	8.8	7.5	12.8	7.8	14.9	9.2	12.5	8.6	11.4	7.1	11.3	5.5
23	13.7	15.1	15.0	15.5	16.6	17.4	14.3	16.0	17.3	20.5	23.4	24.9	23.3	23.1	14.6	16.3	9.9	11.6
24	15.2	13.7	14.3	13.2	15.5	15.0	13.8	15.6	17.1	21.5	21.0	24.1	16.8	19.5	13.4	13.9	11.9	10.1
25	11.6	11.3	10.1	11.1	9.7	11.3	8.8	10.8	11.1	12.4	13.4	14.9	12.1	11.2	15.8	8.8	13.0	8.3
26	10.6	12.7	13.5	15.0	15.8	17.3	15.9	19.0	23.0	26.5	28.9	30.0	26.5	26.3	14.9	18.1	12.2	13.3
27	11.9	17.4	10.8	17.9	10.6	18.7	11.1	18.8	11.2	17.7	13.2	18.5	15.7	22.0	17.1	17.1	11.9	12.7
28	14.1	12.6	15.5	15.4	17.5	18.2	17.9	19.9	23.3	25.7	28.3	28.2	23.6	24.6	17.8	17.6	14.1	13.4
29	15.5	13.3	15.9	13.0	15.8	12.9	19.0	12.4	16.3	15.3	17.7	18.2	23.7	15.4	19.7	11.2	10.8	9.0
30	11.5	14.0	10.4	13.9	10.0	13.7	9.8	12.9	10.3	13.5	11.8	14.5	12.0	13.8	11.5	10.3	5.8	7.1
31	15.2	14.6	16.6	14.6	17.4	14.8	20.2	14.2	18.6	15.7	17.8	15.9	22.1	14.7	17.5	10.3	9.0	6.2
32	14.2	10.1	14.8	11.2	13.3	12.3	15.0	11.9	15.7	10.8	13.9	10.7	14.0	9.7	12.3	9.9	7.5	7.9
33	12.6	10.9	13.7	13.4	14.8	15.9	14.3	16.2	15.1	15.1	18.4	16.1	17.8	16.4	11.2	12.4	8.8	9.8
34	10.9	6.7	11.6	8.2	13.3	9.6	15.4	10.4	16.6	11.6	17.1	13.3	15.9	14.2	11.6	10.8	9.1	7.8
35	9.3	10.9	10.0	13.0	11.6	14.6	12.2	17.7	13.4	22.9	15.6	26.3	14.4	28.1	9.4	21.4	7.6	16.2
36	9.1	9.3	9.8	9.7	10.7	11.3	10.0	13.9	10.3	16.8	10.5	18.8	12.7	19.3	11.0	14.4	7.4	11.3
37	17.0	17.8	18.4	19.0	17.1	18.5	18.9	17.4	17.7	18.9	16.5	19.5	18.7	16.8	14.4	12.0	6.3	8.8
38	18.5	15.9	20.9	15.0	21.2	14.5	22.9	13.9	23.4	16.5	19.7	17.7	16.4	11.9	12.9	11.3	10.8	9.8
39	14.0	11.8	15.5	11.9	17.5	12.8	18.4	14.0	19.9	15.3	21.7	17.8	19.3	20.3	13.1	15.2	9.5	10.9
40	15.0	9.7	17.0	12.3	19.8	14.2	21.8	16.6	22.8	20.5	22.9	22.7	20.3	24.2	13.9	17.9	9.2	13.2
41	13.4	7.2	14.7	9.0	16.4	10.9	19.4	14.5	20.2	19.7	20.1	21.7	17.2	23.0	11.8	17.6	8.8	13.2
42	12.2	12.3	14.0	15.7	16.1	17.4	15.1	16.6	16.5	17.5	20.6	21.7	22.1	21.3	16.6	17.5	12.8	11.4
43	10.2	6.7	13.2	7.6	16.1	8.8	18.3	9.2	17.7	9.7	16.9	10.4	21.2	11.2	16.7	12.3	11.1	10.3
44	14.9	5.8	16.4	7.5	18.1	10.1	18.3	12.3	18.8	13.0	20.3	14.6	18.5	14.6	12.7	11.2	8.1	8.5
45	13.4	10.8	14.6	11.7	15.1	11.8	14.4	11.8	13.5	11.2	13.9	11.0	12.6	12.4	8.8	10.3	6.6	8.1
46	14.5	10.8	17.1	14.5	19.2	18.1	20.0	20.8	20.2	22.7	21.2	22.4	18.0	21.7	11.7	21.0	10.1	15.7
47	-	13.2	-	14.0	-	15.0	-	16.4	-	15.6	-	16.4	-	13.9	-	7.1	-	5.6
48	13.8	12.5	14.9	13.9	16.0	15.8	15.9	16.7	14.2	15.7	14.0	16.6	15.9	18.9	10.5	14.4	8.1	10.9
49	10.0	13.7	8.8	12.4	9.1	12.1	9.5	9.9	9.4	8.7	11.4	9.5	16.4	12.0	18.4	12.1	11.8	10.6
50	9.4	14.2	9.5	12.0	10.5	13.2	10.7	16.2	10.7	16.0	11.5	17.4	18.1	18.6	17.3	14.3	9.8	12.0
51	12.3	7.0	13.4	9.0	14.2	13.5	15.7	15.7	15.4	14.7	15.1	14.9	17.2	16.4	13.9	12.4	9.4	10.3
52	7.1	9.9	7.6	9.9	9.2	8.2	9.8	8.3	9.0	9.1	8.6	11.3	8.4	12.9	6.4	10.1	5.0	9.1
53	8.5	9.6	10.0	10.1	12.1	11.3	12.8	11.0	11.3	12.4	11.0	13.6	10.4	15.6	10.6	11.7	9.5	10.0
54	11.6	8.7	13.0	10.4	14.6	13.1	15.2	14.9	14.2	16.0	14.2	17.3	17.8	18.5	17.6	14.2	11.9	12.7
55	8.9	11.4	11.0	15.1	13.5	19.6	13.6	19.0	12.6	18.9	12.8	19.5	15.4	20.7	15.6	16.6	11.7	14.9
56	11.6	8.3	13.0	9.2	14.7	11.8	14.7	13.4	14.1	14.7	14.2	16.1	17.1	17.5	14.0	12.9	9.4	11.4
57	6.2	14.9	6.6	17.5	7.5	21.5	7.3	20.6	7.7	18.6	9.3	18.2	10.6	17.1	9.9	12.6	8.0	10.3
58	8.8	6.7	10.6	7.3	12.6	8.1	12.8	10.0	12.4	13.9	12.6	16.6	16.8	15.7	15.0	10.9	10.3	9.5
59	10.8	10.6	12.0	10.4	13.4	11.8	14.0	13.2	13.8	13.0	13.7	13.0	17.1	13.7	11.3	10.5	8.8	8.1
60	8.1	11.9	8.6	12.5	10.3	12.8	11.3	13.2	14.8	13.0	20.6	12.4	21.3	13.4	12.4	10.4	8.7	6.5
61	6.8	11.1	7.0	11.5	7.5	13.4	8.3	12.2	7.9	12.4	8.1	15.5	9.8	16.9	9.2	13.0	8.1	10.5
62	5.8	5.0	7.2	6.4	9.0	7.7	8.9	7.7	11.3	10.3	16.5	14.3	17.6	15.8	13.9	11.5	9.7	9.5
63	10.3	17.7	13.3	16.0	15.4	17.3	15.7	15.3	18.2	13.2	23.2	16.2	24.6	17.6	21.0	13.8	16.1	11.2
64	5.6	9.8	5.9	9.0	6.7	9.9	7.5	9.6	10.1	9.3	12.4	11.6	13.6	12.4	11.4	10.0	8.9	8.4
65	13.6	11.1	17.4	14.3	20.5	16.2	20.0	16.3	17.8	15.1	17.8	15.5	17.1	17.1	12.3	13.0	10.0	10.2
66	7.1	7.6	8.1	9.9	10.0	11.9	10.1	12.9	14.9	16.6	20.5	19.7	19.6	20.9	11.4	15.8	8.7	11.8
67	6.8	8.3	6.6	9.6	7.8	12.1	7.4	13.6	7.5	16.3	11.0	17.0	11.5	17.6	7.0	13.4	5.3	10.5
68	10.6	7.3	10.9	7.6	11.3	8.6	10.3	8.8	10.7	8.1	11.4	9.1	15.1	13.8	10.7	11.4	8.6	8.0
69	10.6	8.1	13.3	10.0	15.6	12.0	16.4	12.7	17.7	16.0	22.8	18.1	24.9	19.7	20.2	15.5	14.4	11.9
70	19.3	18.2	20.4	18.5	20.4	18.1	21.6	16.0	21.1	17.3	21.6	18.5	23.9	16.2	20.1	11.1	11.8	7.4
71	-	11.9	-	13.0	-	14.8	-	18.6	-	20.0	-	18.3	-	14.6	-	11.5	-	9.8
72	-	13.5	-	14.8	-	16.9	-	19.0	-	20.4	-	20.1	-	18.5	-	15.3	-	12.6
73	-	14.9	-	16.2	-	16.0	-	17.9	-	19.3	-	18.5	-	17.1	-	14.5	-	12.5
74	-	16.0	-	14.6	-	15.0	-	16.7	-	17.3	-	15.8	-	13.2	-	10.8	-	9.0
75	-	10.2	-	10.8	-	13.1	-	16.5	-	18.1	-	16.9	-	18.9	-	16.5	-	14.0
76	-	16.0	-	17.8	-	19.0	-	20.1	-	21.1	-	19.8	-	20.3	-	15.5	-	12.2
77	-	20.9	-	22.6	-	24.0	-	22.6	-	21.5	-	22.0	-	26.4	-	22.2	-	18.3
78	-	15.6	-	16.2	-	17.0	-	16.8	-	16.6	-	15.6	-	15.8	-	12.8	-	10.6
79	-	22.3	-	21.5	-	20.1	-	18.7	-	17.1	-	14.4	-	14.1	-	10.5	-	8.8
80	-	14.1	-	21.6	-	28.0	-	30.1	-	31.6	-	29.5	-	25.2	-	18.9	-	14.7

Table E2: Directional 3-second Gust Wind Speeds (equalled or exceeded once per year) – m/s

Note: Exg = Existing situation, New = proposed development, - = not measured

Location	100		110		120		130		140		150		160		170		180	
	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New
1	9.7	8.9	9.0	6.3	12.4	10.6	13.3	12.5	12.6	10.6	10.2	8.8	11.4	9.7	11.0	9.3	11.0	8.7
2	8.4	6.6	5.4	5.3	7.6	6.7	9.6	7.6	9.8	7.8	7.8	6.1	9.0	6.9	9.7	7.9	10.0	7.7
3	10.6	9.7	6.7	7.7	10.0	10.1	13.1	12.2	12.5	12.4	9.3	9.0	8.7	7.9	7.8	7.0	8.6	7.1
4	10.2	10.7	6.0	8.2	8.2	9.7	9.1	10.5	9.3	10.5	7.9	8.6	9.2	9.7	10.1	9.3	10.3	7.8
5	12.1	10.8	8.4	9.1	13.0	11.7	14.2	14.0	13.1	13.9	11.1	11.3	11.8	10.7	10.6	11.0	9.7	10.6
6	9.1	8.0	5.5	6.4	7.7	8.9	9.6	11.7	9.8	10.8	8.0	8.8	9.7	10.8	11.7	11.0	11.5	10.9
7	11.5	10.0	8.0	9.1	11.4	9.7	11.8	11.3	10.4	10.3	8.0	7.9	8.4	8.1	7.7	7.9	7.2	8.8
8	5.8	5.7	4.6	4.9	7.7	6.7	8.6	7.2	7.4	7.0	6.4	4.9	9.1	4.0	10.9	4.2	11.3	5.9
9	5.5	8.5	5.0	6.9	8.0	9.1	11.5	10.5	11.9	10.5	9.6	8.0	9.6	7.2	7.9	6.7	8.4	5.5
10	11.5	12.7	9.5	8.9	13.0	13.1	12.9	14.6	13.6	12.3	11.5	9.9	12.1	11.1	11.3	10.7	10.9	8.9
11	8.0	7.6	6.0	7.3	8.5	7.8	10.6	8.5	10.2	8.9	8.0	6.3	8.9	7.1	9.2	8.4	9.1	7.8
12	11.3	10.5	6.0	6.7	8.1	8.1	10.2	9.9	10.5	10.3	7.7	8.0	7.8	7.9	6.9	6.8	7.2	5.6
13	13.3	6.3	6.5	4.7	8.6	5.3	9.6	5.7	10.1	5.8	7.8	6.0	8.0	7.5	6.7	7.5	6.8	6.3
14	12.6	11.7	8.4	9.4	12.3	11.2	12.2	11.2	11.3	10.4	9.2	7.6	10.1	7.9	9.2	8.3	7.7	7.9
15	14.2	10.9	7.7	7.6	10.2	8.6	9.8	9.1	8.2	8.3	6.3	6.0	6.3	5.7	5.7	5.8	6.8	5.6
16	10.9	8.5	5.9	6.4	8.2	7.3	7.9	8.1	7.1	7.4	5.4	5.5	6.1	6.1	6.1	6.6	7.2	6.6
17	11.0	9.6	7.1	7.6	10.0	10.3	12.2	12.1	11.6	11.4	8.8	8.5	9.6	9.2	9.2	9.3	8.1	9.2
18	10.0	12.0	6.4	9.0	8.0	10.5	9.9	11.3	13.0	10.8	10.9	9.9	11.3	11.8	10.4	11.1	9.9	9.6
19	9.4	8.7	6.8	5.6	9.7	8.3	10.9	9.1	11.0	8.6	8.5	8.0	9.0	9.3	8.8	10.5	8.6	10.1
20	10.2	6.1	7.7	3.7	10.5	4.5	10.4	5.0	9.5	4.6	7.5	4.1	9.4	5.1	9.3	4.7	9.0	5.0
21	12.3	8.2	7.2	5.5	9.7	7.7	10.3	8.6	9.9	8.2	7.8	7.4	8.1	10.6	7.9	11.9	7.8	10.7
22	12.5	4.7	8.1	3.6	11.2	5.8	11.8	6.5	11.2	5.8	8.2	5.0	9.9	5.8	9.9	5.9	9.2	5.7
23	10.4	10.9	7.7	7.7	9.3	12.1	14.6	13.5	16.2	13.2	13.3	11.8	14.0	12.8	12.4	12.1	11.1	10.9
24	11.9	7.0	7.0	5.8	9.5	7.1	10.3	8.3	10.6	8.3	8.4	8.0	8.5	11.7	8.3	13.3	8.2	12.4
25	13.0	7.0	7.8	4.5	10.7	6.0	11.8	6.8	10.6	6.3	7.6	4.7	8.0	6.3	7.9	9.1	7.6	10.3
26	14.4	12.3	11.2	8.4	12.8	12.3	15.7	13.7	16.7	13.0	13.5	11.3	13.7	11.2	11.8	11.1	11.3	10.3
27	12.3	6.9	7.4	4.9	9.7	7.5	10.3	9.4	8.9	8.8	6.6	8.0	6.5	9.1	6.4	8.4	6.4	9.0
28	16.8	11.8	12.3	5.6	14.7	7.9	16.1	10.4	17.3	9.4	12.3	9.2	11.8	10.4	11.0	10.1	12.5	10.6
29	11.2	7.7	7.9	5.1	9.3	9.4	11.5	11.5	12.5	11.1	9.4	11.3	9.4	13.9	9.0	13.2	10.2	12.5
30	6.3	6.1	4.5	4.2	5.7	5.5	7.0	6.6	8.4	5.9	6.2	5.3	5.9	6.5	5.2	8.3	5.3	9.9
31	7.7	9.4	5.8	8.0	7.0	12.6	8.3	16.3	10.4	14.2	7.1	13.2	6.2	15.8	5.8	15.6	5.7	16.7
32	7.5	10.7	6.3	8.0	7.2	10.8	10.0	12.5	10.3	11.5	8.0	10.2	8.4	12.4	9.6	12.2	9.3	13.5
33	9.3	8.0	6.9	5.8	8.6	6.5	8.8	7.1	9.7	7.0	7.5	7.5	8.5	10.3	8.8	10.2	7.5	11.0
34	9.7	8.7	7.6	6.6	9.4	7.2	9.5	7.9	7.7	6.9	5.0	6.1	6.3	9.3	5.3	8.7	5.9	9.6
35	7.7	17.0	6.7	13.0	8.4	13.6	9.9	12.5	9.0	11.4	6.2	7.5	6.9	10.2	7.4	11.5	8.1	12.9
36	6.6	10.7	4.9	8.5	6.2	9.5	7.9	9.1	8.7	8.1	7.0	5.7	6.8	6.7	6.7	8.5	6.6	10.6
37	5.8	6.0	3.8	3.8	4.7	7.5	6.1	9.6	6.9	9.3	5.2	9.9	5.2	12.3	5.1	12.0	5.1	13.4
38	12.0	13.5	10.1	10.4	11.7	13.2	17.1	15.3	17.7	13.8	12.4	10.8	12.0	11.5	11.1	10.6	10.2	11.0
39	9.4	12.4	6.8	9.5	8.8	10.8	10.4	12.0	11.1	11.0	8.5	9.2	9.0	12.5	9.5	11.9	8.5	12.8
40	8.8	12.9	7.0	9.8	9.1	10.6	7.8	10.8	7.4	9.6	5.3	8.1	5.6	10.9	5.8	10.7	5.5	11.8
41	8.7	13.2	5.3	10.3	6.5	10.5	6.7	9.5	6.2	7.8	4.5	7.0	6.1	9.6	6.8	9.6	7.6	10.8
42	11.7	13.0	7.3	9.6	9.4	11.8	8.5	11.7	8.2	10.3	6.5	7.8	5.8	8.1	5.7	7.2	5.7	7.7
43	12.0	13.2	9.2	9.6	10.7	11.6	17.1	15.4	16.3	13.3	11.0	9.8	10.5	9.7	10.0	8.5	10.2	8.2
44	8.0	8.1	6.7	5.8	7.8	7.4	14.2	9.7	13.7	8.8	9.9	7.8	10.3	10.8	10.9	9.7	9.9	10.8
45	6.2	7.3	4.6	5.3	5.2	6.0	8.0	6.5	8.4	5.7	6.6	6.5	7.1	9.0	7.3	9.4	6.7	10.6
46	10.7	13.9	7.7	10.5	10.2	10.8	10.3	10.9	12.5	10.5	10.2	7.8	11.1	6.6	9.6	5.5	9.3	6.4
47	-	8.3	-	6.7	-	10.9	-	13.4	-	11.9	-	11.9	-	13.5	-	14.0	-	15.0
48	8.3	11.6	6.2	9.3	7.9	8.7	8.8	7.7	9.0	8.2	7.0	9.3	8.6	11.5	8.3	11.3	7.2	12.3
49	11.2	9.1	7.3	6.7	9.8	8.0	10.9	9.7	9.5	8.9	6.6	7.8	7.3	9.4	7.6	9.1	7.1	8.7
50	9.6	10.0	6.9	7.3	9.6	8.2	10.8	8.9	9.7	8.3	6.9	7.8	7.9	9.4	8.5	9.8	7.8	10.9
51	10.1	8.6	7.9	6.4	10.4	8.4	11.6	9.4	11.0	8.9	8.7	5.3	10.1	5.4	10.2	5.7	9.4	6.3
52	5.4	8.5	3.9	6.5	5.4	8.1	6.3	8.3	6.0	7.5	4.7	5.1	5.7	5.7	6.4	6.3	7.5	6.7
53	10.7	8.7	7.5	6.6	10.7	7.6	12.1	7.3	11.6	6.4	9.2	5.0	10.7	6.7	11.7	7.6	12.1	8.0
54	11.7	10.3	8.3	6.8	11.8	7.4	13.2	7.6	12.7	6.7	9.5	6.1	10.8	7.9	12.2	8.3	11.3	8.7
55	12.3	11.8	8.9	8.1	12.5	9.4	14.0	9.4	13.4	8.4	10.2	6.5	11.8	8.3	13.7	8.9	13.7	10.2
56	10.0	8.5	7.8	5.7	11.4	7.1	11.8	8.4	11.1	8.5	8.3	10.4	9.2	12.5	9.5	12.1	8.4	13.3
57	9.0	8.6	7.9	6.4	10.6	7.2	12.4	9.3	11.7	9.2	8.9	7.2	10.0	9.3	11.2	9.5	10.5	8.3
58	10.9	7.0	8.5	5.0	12.4	7.0	12.4	8.0	11.3	6.8	8.5	5.1	9.1	4.6	10.8	4.4	10.3	5.6
59	9.3	11.4	6.9	9.1	9.5	11.2	10.0	12.2	9.1	11.8	6.9	7.8	8.0	9.1	6.7	8.8	6.4	8.5
60	9.4	11.1	6.5	8.8	9.1	10.4	8.5	11.3	7.6	10.5	6.0	7.3	6.1	8.5	5.8	8.2	5.5	7.9
61	9.6	9.6	8.9	7.6	11.8	9.9	11.6	13.1	9.7	12.7	7.2	9.8	8.0	10.8	8.7	11.3	9.0	11.2
62	11.0	8.3	6.5	6.3	9.0	8.0	9.9	9.0	9.0	8.6	6.9	6.2	7.3	5.3	7.2	5.2	6.2	5.1
63	17.7	10.7	10.4	8.3	14.8	11.0	12.4	12.6	10.3	11.8	7.6	8.3	8.2	9.2	9.2	8.9	9.9	8.6
64	10.2	8.2	9.6	6.6	13.5	8.6	12.9	9.5	11.1	9.0	7.9	6.4	7.3	7.5	6.2	6.6	6.2	6.1
65	10.3	11.5	7.1	9.1	10.0	11.4	9.7	12.6	8.5	12.3	6.0	8.3	6.2	8.3	5.7	7.4	5.9	7.3
66	9.4	10.0	5.7	7.4	7.9	8.7	7.3	9.1	6.4	8.3	4.8	5.3	4.8	6.4	5.3	6.1	5.2	6.6
67	5.5	10.4	3.5	8.2	4.8	9.4	5.1	9.0	5.5	8.4	4.3	5.3	4.2	6.3	4.5	6.2	5.0	7.1
68	9.0	7.9	7.2	5.1	9.2	6.0	12.1	8.0	13.5	8.0	10.0	8.1	10.2	10.4	10.3	10.5	9.6	11.6
69	15.5	12.7	9.5	9.8	13.6	11.9	12.5	13.0	10.6	12.7	7.2	8.2	6.8	8.5	7.6	7.4	7.7	7.9
70	10.6	7.0	7.5	4.3	9.2	6.1	9.4	7.5	9.4	7.4	6.6	8.6	6.4	11.3	6.6	10.6	8.1	11.3
71	-	7.8	-	5.3	-	6.6	-	7.4	-	6.7	-	4.8	-	5.3	-	5.7	-	5.9
72	-	12.2	-	9.5	-	11.8	-	12.5	-	12.1	-	7.8	-	6.8	-	6.4	-	6.3
73	-	12.9	-	10.3	-	13.2	-	14.5	-	14.2	-	9.2	-	7.9	-	6.2	-	5.1
74	-	9.7	-	7.9	-	10.2	-	12.2	-	12.0	-	9.9	-	11.6	-	9.4	-	7.4
75	-	15.5	-	12.7	-	15.1	-	15.6	-	14.2	-	10.8	-	11.3	-	9.5	-	7.4
76	-	11.5	-	8.8	-	11.4	-	14.9	-	14.5	-	12.3	-	13.6	-	11.2	-	8.5
77	-	15.9	-	11.9	-	12.2	-	12.0	-	11.3	-	8.0	-	7.3	-	5.2	-	4.3
78	-	13.9	-	10.7	-	12.3	-	13.2	-	11.3	-	6.9	-	7.7	-	9.7	-	10.9
79	-	9.8	-	7.9	-	8.6	-	9.5	-	8.2	-	5.9	-	7.0	-	9.2	-	10.6
80	-	15.0	-	11.8	-	14.5	-	16.3	-	14.8	-	11.0	-	11.5	-	8.8	-	6.4

Table E2: Directional 3-second Gust Wind Speeds (equalled or exceeded once per year) – m/s

Note: Exg = Existing situation, New = proposed development, - = not measured

Location	190		200		210		220		230		240		250		260		270	
	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New
1	11.4	8.9	11.5	8.9	14.4	10.7	14.6	13.3	17.3	15.2	14.4	14.2	12.3	14.3	13.5	13.3	15.4	13.6
2	11.1	8.1	11.8	8.9	13.1	10.9	11.8	12.4	12.6	11.6	12.6	10.7	14.2	11.7	15.1	11.3	16.5	12.6
3	10.2	9.5	11.6	10.5	13.6	12.2	14.2	15.5	15.9	17.3	14.4	16.9	12.6	17.5	13.4	17.9	12.5	16.8
4	11.2	8.8	12.2	10.2	13.6	11.4	14.5	14.4	19.0	17.7	18.0	17.3	13.8	17.5	16.4	18.6	13.0	17.7
5	12.7	6.8	14.9	5.7	17.7	6.7	18.4	9.1	19.6	10.4	19.8	10.0	18.8	11.5	17.8	12.3	16.3	11.5
6	15.1	8.8	18.6	8.8	23.4	7.9	24.0	7.9	19.0	10.1	17.0	11.1	15.1	14.2	14.8	14.0	14.5	11.6
7	10.6	10.2	14.5	11.4	17.9	10.3	18.2	10.5	16.7	7.8	15.8	7.5	14.4	10.7	13.5	11.9	13.4	10.0
8	13.1	8.4	14.4	10.2	16.7	13.3	18.0	15.7	22.6	19.1	20.8	18.8	15.4	18.9	16.3	17.4	10.2	13.9
9	10.0	4.2	11.8	4.4	14.2	5.7	15.2	7.2	13.7	9.2	12.5	10.6	11.7	12.0	13.0	12.8	12.6	10.1
10	9.1	7.3	9.1	7.8	11.3	10.7	12.8	12.9	14.5	13.0	13.3	11.0	10.4	11.0	11.6	11.1	13.8	11.8
11	10.4	8.4	10.4	8.9	12.4	10.4	11.1	10.7	14.6	10.4	14.2	10.1	13.4	10.8	13.6	11.0	12.4	10.7
12	8.0	8.1	8.7	9.3	11.4	11.5	12.5	14.9	17.3	19.4	15.1	20.0	13.2	21.6	16.1	22.1	16.4	20.8
13	7.5	5.3	9.3	6.2	11.4	8.1	12.7	9.4	15.7	11.6	13.9	11.4	11.3	12.1	15.0	11.5	14.2	10.4
14	9.2	5.7	11.6	6.2	15.8	9.4	16.9	11.1	17.4	12.6	17.2	13.1	17.5	13.8	17.1	13.5	15.1	11.1
15	8.9	4.9	10.2	6.3	12.0	8.2	12.6	10.7	12.9	13.4	12.9	14.3	12.1	14.8	14.6	14.5	13.6	12.3
16	10.6	5.5	13.2	6.3	16.5	7.7	17.3	9.5	15.4	12.1	13.9	12.9	12.4	13.7	13.3	13.3	12.6	11.2
17	9.1	7.5	12.0	7.5	16.1	7.6	16.6	8.3	14.7	10.7	13.2	11.5	12.2	12.5	11.9	12.2	12.1	10.4
18	8.3	8.3	8.0	7.7	9.4	9.6	11.0	12.1	13.0	14.2	10.4	13.2	7.5	13.6	7.9	13.3	8.5	11.4
19	8.8	11.5	8.9	12.9	9.4	16.3	9.6	16.8	10.4	15.5	11.2	15.0	10.3	15.4	11.4	15.4	13.5	14.1
20	9.8	6.8	10.3	7.9	10.2	9.0	9.4	10.9	10.3	15.6	10.5	15.8	10.2	17.8	12.1	18.4	11.9	18.3
21	8.4	10.4	9.2	11.2	10.9	14.6	12.4	16.4	11.5	16.1	9.6	14.8	7.7	14.8	7.8	14.6	9.4	13.6
22	10.1	6.2	10.9	7.2	11.2	9.0	10.8	9.4	11.6	11.7	10.8	11.6	10.0	13.9	9.9	14.9	10.1	15.7
23	12.5	13.0	17.1	17.0	23.1	22.8	24.7	25.8	28.2	27.6	24.1	22.0	17.7	19.6	17.9	16.9	15.4	15.3
24	8.7	13.0	12.7	13.8	17.4	17.5	19.1	19.2	20.8	19.5	17.6	17.8	13.8	18.2	14.1	18.5	11.6	18.3
25	8.4	13.1	9.6	14.6	13.3	17.7	15.2	18.6	17.1	18.6	15.6	18.5	13.8	20.5	13.7	20.7	11.6	19.6
26	10.9	10.9	11.3	11.7	13.8	13.6	14.0	16.5	15.8	17.5	14.8	15.2	14.0	14.3	13.8	14.5	13.2	14.0
27	6.8	11.5	8.5	12.4	13.0	14.4	14.3	16.2	17.0	18.5	16.7	18.6	16.1	19.1	15.4	19.0	13.4	17.1
28	13.8	12.2	17.1	14.6	22.3	20.4	21.7	23.0	23.9	23.3	22.7	21.7	20.3	20.2	19.1	18.6	17.8	16.6
29	11.3	12.9	16.2	14.0	23.2	19.2	21.8	22.6	24.3	23.5	22.6	21.1	20.8	20.1	21.6	19.5	20.0	18.5
30	5.8	14.0	8.2	14.4	12.2	14.7	12.1	15.4	14.0	15.7	13.7	15.2	13.4	14.5	12.1	14.0	11.1	12.3
31	6.7	15.9	8.7	16.7	14.4	18.1	13.8	17.2	14.6	18.1	13.5	17.9	12.8	18.4	12.6	18.0	11.7	16.8
32	10.3	13.4	11.5	15.1	12.8	17.9	13.4	17.6	13.6	16.5	13.8	15.9	12.5	13.9	12.0	13.3	11.3	12.6
33	8.6	12.6	10.0	14.5	13.0	17.1	14.7	19.2	15.2	20.8	16.1	20.7	18.0	19.3	21.2	19.3	23.0	17.1
34	6.2	10.9	6.4	13.0	7.9	15.4	9.2	17.2	10.1	19.4	11.9	19.0	13.2	18.6	15.2	19.5	13.7	19.9
35	8.7	14.9	9.1	17.2	8.3	21.1	9.9	21.2	9.9	19.5	11.1	19.0	11.3	18.7	12.7	19.5	11.6	18.2
36	6.9	11.7	8.1	13.0	10.2	14.9	13.0	15.3	13.8	15.4	16.2	15.4	16.6	16.0	18.5	16.4	16.6	13.6
37	5.4	13.7	7.0	15.1	9.6	17.9	9.8	17.8	11.2	17.4	11.3	16.4	11.5	13.3	11.0	11.7	9.9	10.3
38	11.0	11.7	10.6	14.0	9.4	19.4	9.6	20.2	9.5	20.0	10.0	19.1	10.3	16.4	11.2	15.4	11.1	13.2
39	9.5	13.5	10.9	15.1	13.5	19.1	14.8	21.8	14.1	23.9	14.9	23.6	17.4	20.2	21.0	18.2	23.7	17.7
40	6.6	12.7	8.0	14.2	11.8	14.5	13.7	15.2	16.3	16.3	18.0	17.1	18.9	17.8	21.6	19.9	22.1	20.5
41	7.6	13.2	7.5	15.8	6.6	16.1	7.7	13.3	9.7	9.3	12.1	8.9	12.6	8.9	13.0	9.0	12.5	8.9
42	6.4	9.4	7.2	11.7	12.8	15.1	16.4	16.0	18.6	17.1	19.9	19.1	16.3	16.4	14.9	16.8	15.5	16.9
43	11.6	7.6	11.5	7.3	9.7	9.5	10.2	10.8	8.3	11.5	8.7	10.9	10.1	7.7	12.7	8.1	14.3	9.9
44	11.1	9.3	12.7	9.3	15.3	12.4	16.5	15.6	15.5	18.2	16.2	16.7	19.0	14.8	23.5	16.0	26.6	23.6
45	7.1	10.3	8.1	9.9	12.2	10.5	13.5	12.0	15.7	14.4	16.9	14.3	17.7	15.2	20.1	17.5	22.1	21.7
46	9.2	5.2	9.5	6.1	9.7	7.5	11.8	9.6	14.4	12.7	16.4	15.1	16.3	16.2	18.0	18.7	17.4	18.4
47	-	14.8	-	16.8	-	18.8	-	18.8	-	19.4	-	19.0	-	18.8	-	17.9	-	12.9
48	8.3	13.6	9.5	15.9	11.9	19.6	13.4	21.3	14.8	23.8	15.7	23.8	16.9	22.7	18.6	23.1	19.0	17.8
49	7.6	7.4	7.9	7.5	10.1	10.3	11.5	13.3	15.4	15.0	15.1	14.0	14.7	14.7	14.2	15.3	12.0	15.6
50	8.7	10.7	9.1	11.9	9.4	13.9	10.0	14.7	9.5	15.3	9.8	14.9	9.8	14.0	10.4	14.2	9.7	14.4
51	10.9	6.0	12.3	6.8	13.8	10.5	14.9	12.6	13.5	13.5	12.9	13.6	11.1	14.2	10.4	15.7	10.3	15.9
52	9.3	6.7	11.4	7.0	14.9	7.0	16.3	8.9	14.8	9.1	13.2	9.6	13.1	11.4	13.8	10.9	12.7	8.3
53	13.9	8.2	15.5	9.2	18.5	10.3	20.5	8.7	19.3	8.4	17.2	8.5	13.4	9.6	12.7	8.9	14.3	7.4
54	12.3	8.1	13.0	8.4	12.7	10.2	13.7	11.4	12.4	11.7	11.8	11.5	11.0	11.1	11.3	10.6	11.7	9.6
55	15.0	10.9	15.8	12.3	16.9	12.8	18.0	11.4	15.1	11.6	12.9	10.7	11.9	10.4	12.6	10.2	13.7	8.3
56	9.2	13.6	10.1	15.0	10.5	13.1	11.6	13.2	12.9	14.5	13.8	14.2	13.0	14.6	12.6	15.6	12.7	15.4
57	11.3	7.3	12.3	8.2	13.5	11.4	14.7	12.0	14.2	13.3	13.4	13.3	12.7	13.0	12.8	13.1	11.9	12.4
58	11.7	7.0	11.7	9.6	12.0	17.1	12.5	17.3	12.2	19.1	12.6	19.1	13.0	18.4	13.5	17.5	14.0	14.1
59	7.4	8.0	7.9	8.5	10.0	9.8	11.5	13.2	14.1	13.7	15.2	15.5	16.2	16.9	17.5	18.5	17.4	15.6
60	6.4	7.2	7.2	8.0	9.1	9.8	10.5	9.2	13.4	9.1	14.6	10.1	15.3	10.6	17.2	11.6	16.1	11.1
61	10.5	8.1	12.2	6.4	14.8	7.8	16.2	8.2	16.2	8.5	14.4	8.2	13.3	7.3	13.1	6.5	12.3	5.4
62	5.2	3.9	5.6	4.1	7.4	4.8	8.3	5.0	8.5	5.4	8.6	5.8	8.3	6.7	8.0	7.2	8.1	6.4
63	12.3	7.7	14.2	8.6	17.4	9.9	19.1	9.2	19.0	6.8	18.0	6.6	15.3	7.0	14.6	7.2	13.4	6.0
64	7.5	6.6	9.2	8.2	11.9	11.2	13.8	11.8	14.6	10.9	14.8	10.8	15.6	9.9	16.6	9.6	16.0	6.8
65	7.5	8.8	9.0	11.0	12.5	15.8	14.5	17.6	14.9	18.1	16.0	18.2	17.0	17.9	19.9	17.9	19.3	13.3
66	6.0	8.1	7.1	10.3	9.2	15.2	10.7	16.0	10.3	11.3	10.7	9.8	11.2	9.3	12.5	9.1	12.9	6.9
67	5.9	10.6	7.1	13.0	9.2	19.6	11.1	21.8	10.9	23.9	10.9	23.4	11.6	24.0	13.9	22.3	14.8	18.5
68	11.4	13.4	12.2	15.6	12.7	17.7	13.0	16.9	11.9	17.0	11.8	17.6	11.6	14.6	12.5	13.3	13.2	11.6
69	9.4	8.0	10.6	9.7	12.9	12.5	14.0	12.3	13.7	8.5	13.5	7.6	13.3	7.3	14.6	7.8	14.1	6.3
70	9.1	13.6	12.7	15.0	16.9	15.8	16.4	16.5	18.3	17.7	17.8	16.5	17.5	17.0	19.5	17.9	18.7	16.8
71	-	9.0	-	12.3	-	15.4	-	14.4	-	13.5	-	14.2	-	16.6	-	18.0	-	17.6
72	-	10.4	-	14.0	-	17.5	-	17.0	-	16.4	-	17.9	-	22.2	-	22.9	-	21.4
73	-	5.4	-	6.6	-	8.6	-	9.1	-	10.2	-	13.3	-	17.4	-	18.1	-	18.2
74	-	5.3	-	6.2	-	9.3	-	10.1	-	10.4	-	10.2	-	13.5	-	16.8	-	17.3
75	-	5.8	-	6.3	-	8.4	-	8.9	-	9.5	-	9.4	-	9.9	-	9.5	-	8.4
76	-	9.2	-	11.1	-	15.9	-	17.0	-	16.9	-	15.2	-	12.2	-	13.7	-	17.6
77	-	4.4	-	5.0	-	6.8	-	7.6	-	8.7	-	9.3	-	13.7	-	17.1	-	18.0
78	-	14.1	-	16.4	-	20.0	-	21.4	-	23.0	-	22.3	-	24.6	-	25.6	-	23.8
79	-	13.2	-	15.1	-	18.0	-	17.8	-	17.5	-	17.1	-	18.8	-	20.8	-	21.1
80	-	7.0	-	9.4	-	14.6	-	17.4	-	20.4	-	20.8	-	18.8	-	14.0	-	9.3

Table E2: Directional 3-second Gust Wind Speeds (equalled or exceeded once per year) – m/s

Note: Exg = Existing situation, New = proposed development, - = not measured

Location	280		290		300		310		320		330		340		350		360	
	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New	Exg	New
1	16.2	14.5	14.5	13.1	12.3	12.8	13.5	14.5	12.0	11.2	10.6	10.1	11.8	11.5	12.2	11.7	13.9	13.2
2	16.6	14.2	15.0	12.6	12.8	10.9	14.9	13.4	14.5	13.5	12.7	11.6	12.7	12.0	10.7	9.9	9.7	8.5
3	13.5	16.0	12.7	14.6	10.4	12.9	12.4	11.5	10.8	8.7	8.3	7.8	7.9	7.3	7.9	6.1	8.9	7.7
4	12.5	14.8	12.8	13.0	14.8	13.4	19.2	16.1	17.7	15.6	13.2	11.0	10.9	9.9	9.9	8.2	9.8	9.9
5	15.7	10.7	15.2	10.2	11.4	9.5	10.0	8.6	12.5	9.3	10.7	7.9	8.2	8.0	6.8	7.8	8.4	8.0
6	12.7	9.6	11.2	9.3	6.9	8.3	8.5	7.2	11.0	8.4	9.2	7.8	6.8	8.0	5.3	7.4	6.1	7.2
7	12.0	8.9	10.4	8.8	7.7	8.0	14.1	10.6	15.5	13.7	11.5	11.0	8.2	10.8	7.3	8.9	7.6	8.2
8	7.4	10.7	8.9	7.7	13.4	11.4	15.0	14.0	13.6	12.7	11.0	9.3	10.5	8.5	10.2	8.4	10.8	9.1
9	11.5	12.0	14.6	14.8	14.4	14.3	15.6	14.8	13.0	12.5	8.4	8.0	7.5	7.4	7.1	6.5	7.2	6.5
10	13.9	11.8	13.2	12.3	14.3	13.8	15.5	15.3	13.9	12.9	12.3	11.8	13.1	12.9	13.4	13.0	15.0	14.5
11	13.6	11.5	13.8	12.9	14.1	15.4	15.4	16.5	12.2	10.5	10.5	9.4	10.8	9.9	10.4	9.4	12.6	10.4
12	18.6	18.3	17.7	16.3	15.3	16.6	15.5	17.0	13.9	13.3	12.6	12.7	11.6	11.8	10.1	9.3	10.1	9.5
13	15.3	10.8	14.0	11.7	10.8	12.3	10.2	12.0	8.9	12.2	9.1	8.4	9.1	7.6	7.4	7.9	7.5	11.3
14	16.5	11.6	17.5	12.2	15.7	12.4	17.2	15.2	16.1	15.7	11.8	11.4	9.6	10.3	7.4	8.4	6.5	8.8
15	13.1	13.4	11.5	14.6	9.9	14.4	11.9	15.3	10.8	13.4	8.7	10.3	7.0	8.6	5.8	7.1	7.4	6.9
16	11.8	11.2	9.5	12.7	7.2	12.4	10.3	11.9	12.6	10.8	10.2	9.4	7.4	9.5	6.9	8.2	7.9	7.8
17	11.3	9.8	8.5	10.3	7.0	10.2	13.3	10.8	15.5	12.7	10.7	10.8	6.2	10.3	5.8	7.7	6.9	6.9
18	8.4	10.5	10.0	10.1	11.1	10.4	12.3	12.3	12.4	12.7	12.2	13.2	14.6	15.4	15.9	15.8	17.1	16.2
19	14.9	13.2	13.3	11.9	12.4	11.1	13.4	12.4	12.3	10.8	11.5	10.2	12.2	10.6	11.2	9.6	12.3	10.3
20	11.6	16.7	11.8	13.4	12.6	12.3	15.2	11.6	13.3	10.1	11.9	9.8	12.2	9.3	11.0	6.9	10.2	5.6
21	9.6	13.1	8.4	13.1	7.7	10.2	9.5	9.8	11.3	10.5	11.8	10.5	13.1	11.4	12.6	10.8	13.2	11.3
22	10.1	14.6	9.5	13.1	11.0	14.7	15.5	15.2	14.3	12.3	12.7	12.1	13.0	11.0	11.8	8.2	11.2	6.5
23	15.1	14.1	17.7	16.6	19.4	18.4	20.3	20.4	17.1	15.7	11.2	10.4	11.5	11.5	9.9	11.1	10.3	12.0
24	11.7	18.5	11.3	17.8	12.9	12.6	13.5	12.4	10.8	9.7	9.2	10.1	12.2	11.6	12.7	11.4	12.9	11.6
25	11.8	19.0	11.3	19.1	11.6	15.3	9.9	13.8	9.8	13.7	10.0	14.0	11.2	13.6	10.6	10.6	10.9	9.3
26	13.6	14.0	11.6	10.3	12.0	10.2	12.8	9.7	10.1	6.6	7.2	6.5	5.7	6.9	5.7	7.3	6.7	8.3
27	13.2	16.6	14.4	18.2	13.9	16.3	9.7	16.6	7.6	16.9	8.3	16.6	10.2	17.2	10.1	15.1	10.3	13.8
28	17.7	16.1	16.7	15.3	16.4	15.1	16.1	13.7	12.5	9.5	8.7	9.0	8.0	9.4	9.2	8.7	10.4	8.9
29	20.5	18.6	20.9	18.9	21.6	20.6	20.8	18.8	15.3	10.5	9.0	10.3	8.3	10.7	9.5	10.0	11.0	10.2
30	10.8	12.0	13.0	15.4	12.0	13.1	9.0	10.2	6.2	10.2	6.7	9.8	8.9	11.9	9.2	11.4	9.4	11.4
31	10.8	16.3	11.4	18.1	10.5	16.2	10.4	13.7	8.4	11.1	6.8	10.2	8.2	11.6	8.9	11.0	10.3	11.4
32	11.6	12.6	9.9	15.0	9.1	13.2	9.1	10.9	6.8	7.9	5.6	6.6	7.7	7.2	8.8	6.9	10.4	7.3
33	21.8	16.7	14.1	13.3	12.7	10.4	12.7	9.3	8.0	6.2	6.7	5.6	8.4	7.3	9.1	7.1	9.5	7.9
34	13.8	18.8	13.1	15.2	14.1	11.7	14.3	10.2	8.5	5.9	6.2	4.0	6.7	4.5	7.1	4.7	8.0	5.2
35	11.7	15.8	11.4	13.6	12.2	11.2	11.5	9.3	7.5	5.2	9.5	4.2	9.9	5.7	8.8	6.5	8.7	7.7
36	15.8	14.4	16.9	12.6	15.5	12.6	12.1	11.9	9.4	7.0	12.1	5.2	11.3	5.9	8.4	5.6	8.0	6.7
37	9.5	9.6	9.6	9.5	9.2	8.9	10.0	8.9	7.5	10.0	5.7	9.1	7.3	10.6	9.0	10.8	11.3	12.4
38	12.2	13.2	11.0	14.3	10.7	14.7	11.3	14.0	8.1	11.6	6.7	11.0	9.8	12.6	12.1	12.1	13.5	12.4
39	24.4	19.7	17.0	13.3	10.5	10.0	10.4	10.4	7.6	7.3	6.4	6.2	7.4	7.2	8.9	7.7	10.6	8.3
40	20.8	19.2	14.8	14.5	15.2	13.6	15.9	11.6	10.6	7.5	8.0	5.6	10.0	6.1	10.2	6.2	11.0	7.1
41	13.6	11.0	10.3	10.8	9.8	13.0	10.1	12.9	7.1	7.3	8.6	3.9	10.8	4.6	11.3	5.6	11.8	6.0
42	18.6	18.7	15.3	16.7	14.7	15.7	13.8	14.5	8.7	8.4	10.3	4.7	11.0	8.0	10.2	10.3	10.3	10.7
43	15.4	11.1	11.5	9.1	7.7	9.0	7.7	8.5	5.4	6.0	4.4	4.5	5.7	5.7	6.6	5.4	7.2	4.4
44	28.4	26.2	22.8	18.1	10.9	12.0	11.7	12.3	8.6	7.9	6.1	5.8	7.9	6.1	9.4	5.3	11.0	5.1
45	22.2	21.6	16.7	16.0	14.9	15.2	14.1	14.0	9.8	9.6	6.4	6.0	8.2	5.7	9.4	5.6	10.5	7.5
46	15.5	17.4	11.2	13.1	10.8	11.3	9.9	11.1	6.8	6.4	9.9	4.8	11.2	6.1	10.4	6.7	11.1	7.9
47	-	10.1	-	9.8	-	8.2	-	7.3	-	7.3	-	8.2	-	11.4	-	10.8	-	10.4
48	16.8	15.7	12.6	13.1	12.8	9.3	10.7	7.4	9.4	6.7	9.4	8.6	11.0	10.9	10.5	10.0	10.4	10.1
49	11.2	14.1	10.7	12.4	10.3	12.3	8.8	12.0	8.7	10.8	8.5	10.5	9.6	10.8	9.0	9.8	8.8	10.3
50	9.6	14.4	9.4	15.5	8.4	14.6	8.4	15.8	8.2	14.7	7.6	14.2	8.3	14.9	7.8	13.2	7.7	12.1
51	10.2	15.3	11.0	14.6	9.0	10.5	9.3	11.1	10.2	11.0	9.4	10.9	9.7	10.4	8.9	7.7	9.3	5.6
52	13.7	7.5	14.5	7.6	13.1	8.6	14.6	11.4	15.8	12.3	12.4	8.5	9.7	7.6	7.0	6.9	6.2	7.9
53	17.6	7.0	18.9	6.7	17.2	6.4	14.4	8.5	15.7	10.5	14.0	6.9	13.2	6.2	10.3	6.1	8.3	7.6
54	13.8	8.7	15.1	8.3	14.1	7.3	12.5	8.1	14.2	8.4	13.3	6.1	13.6	6.2	11.3	6.1	9.7	7.2
55	16.5	8.4	17.4	8.6	16.0	8.2	12.6	7.6	10.0	6.2	11.6	6.6	12.8	7.9	10.5	7.9	8.4	8.7
56	13.4	13.9	14.1	12.5	12.2	9.8	11.4	8.9	12.2	7.5	11.8	8.0	12.6	10.4	10.7	9.4	9.6	8.2
57	11.3	10.7	10.1	9.2	9.8	7.3	7.1	6.8	5.8	7.4	5.8	8.3	6.1	9.9	5.1	10.6	5.0	11.8
58	14.6	12.0	14.9	9.8	12.9	8.4	10.9	9.4	7.8	8.6	8.7	7.2	9.9	7.5	8.2	6.2	7.5	5.8
59	15.2	13.1	13.0	10.0	11.8	5.9	9.8	6.1	9.5	7.2	9.1	8.2	10.1	10.0	9.0	9.3	8.8	9.3
60	14.2	9.6	13.6	7.6	12.9	5.3	10.1	5.6	7.3	7.1	7.1	7.9	7.6	9.6	6.8	8.9	7.0	9.5
61	10.8	5.2	8.2	4.8	6.7	4.6	6.3	4.8	6.1	5.6	5.8	6.3	6.1	7.6	5.1	8.3	5.3	9.1
62	8.2	6.6	7.0	7.3	5.5	7.0	9.8	8.2	9.3	8.2	5.8	6.1	4.3	5.3	4.0	4.1	4.4	4.1
63	11.7	5.3	10.1	5.2	8.6	5.3	7.6	5.9	8.9	9.6	5.9	11.5	6.1	13.5	5.9	13.2	7.0	14.5
64	13.6	5.4	13.8	5.1	13.1	4.5	9.6	5.0	6.5	6.5	6.6	7.0	6.0	8.2	4.9	7.8	4.9	8.2
65	17.5	9.9	17.9	8.6	16.4	5.3	12.6	5.5	8.2	7.5	9.5	8.8	9.0	10.5	7.3	9.3	7.7	9.0
66	11.8	6.3	10.3	6.0	10.3	6.6	8.8	6.5	6.6	4.2	7.4	4.0	8.1	5.0	6.6	4.9	6.5	5.5
67	13.8	14.9	12.1	13.1	13.2	7.8	10.5	5.1	6.3	4.8	6.7	6.4	7.0	7.3	5.6	6.5	5.6	6.3
68	13.3	11.7	13.7	11.9	12.6	8.7	11.6	8.6	6.9	7.3	5.5	6.5	6.3	6.1	6.5	5.3	7.7	5.6
69	12.0	5.7	11.9	5.4	10.8	5.4	8.3	5.5	7.0	4.9	8.2	5.3	7.9	5.9	6.6	5.6	6.9	5.9
70	19.5	17.7	18.9	17.6	18.9	18.3	20.0	18.6	16.3	11.4	11.3	11.0	7.9	12.5	9.7	12.3	12.8	13.4
71	-	15.6	-	15.2	-	15.4	-	15.0	-	13.6	-	12.6	-	12.0	-	9.5	-	8.9
72	-	18.2	-	14.9	-	14.0	-	14.3	-	12.9	-	12.2	-	12.2	-	9.5	-	9.4
73	-	16.4	-	18.6	-	19.3	-	17.7	-	15.9	-	14.2	-	13.7	-	11.1	-	10.7
74	-	16.3	-	18.7	-	18.5	-	17.3	-	15.5	-	13.9	-	13.9	-	12.3	-	12.5
75	-	7.5	-	6.7	-	6.1	-	6.9	-	6.2	-	4.9	-	6.5	-	6.7	-	7.8
76	-	16.7	-	16.5	-	17.8	-	18.8	-	13.7	-	11.2	-	12.0	-	11.2	-	11.9
77	-	16.0	-	15.2	-	17.9	-	20.4	-	19.2	-	17.3	-	17.3	-	14.6	-	15.4
78	-	20.5	-	16.3	-	15.4	-	16.1	-	14.7	-	14.9	-	16.1	-	12.9	-	12.0
79	-	19.0	-	15.8	-	15.2	-	17.5	-	18.0	-	18.2	-	19.4	-	17.1	-	16.9
80	-	7.5	-	6.5	-	6.4	-	7.3	-	7.4	-	6.0	-	6.5	-	6.7	-	8.1

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