Date: September 3, 2018

Reference: WC837-08F02(rev0)- WE Letter

Statewide Planning Pty Ltd

Level 2, 7 Charles Street,
Parramatta, NSW 2150

RE: 5-7 CHARLES STREET & 116 MACQUARIE STREET, PARRAMATTA PEDESTRIAN WIND ENVIRONMENT LETTER

Dear Mr Glenn Francis,

This letter addresses the following queries raised by Parramatta City Council in relation to our Wind Environment Study for the development referenced above. In particular these queries relate to the impact on the wind conditions adjacent to the proposed Arthur Phillip High School development opposite the subject development:

1. *The likely wind gust speed that a child can tolerate safely and in what circumstances (i.e. gust from 0 – 16m/s or gust from 10m/s to 19m/s)*
2. *The likelihood that a child will be in a position, during the maximum gust, that would result in them falling into the roadway.*
3. *Why it is more appropriate to apply the weekly averages to comfort as opposed to annual gusts.*
4. *Why the Windtech wind reports for the school and this application appear to differ.*
5. *Also as the main pick-up/drop-off for children appears to be to the school's south-east entrance Council have requested retesting wind conditions at this location.*

Our response to the above 5 points are provided below.

Items 1 and 2:

Screenshots of the accompanying video (Ref: *WC837-08 10yo child gust.mp4*) showing a 10 year old child walking along and across a 19m/s and 23m/s transient gust wind speed have been included in Figures 1a to 1d. Some slight difficulty and bracing in walking was observed for the higher wind speeds, however, no signs of unbalance was noted during the tests.

Figure 1a: Screenshot of 19m/s Gust, 16% Turbulence Intensity Wind with a 10yo Child Moving Along the Wind Direction

Figure 1b: Screenshot of 19m/s Gust, 16% Turbulence Intensity Wind with a 10yo Child Moving Across the Wind Direction

Figure 1c: Screenshot of 23m/s Gust, 16% Turbulence Intensity Wind with a 10yo Child Moving Along the Wind Direction

Figure 1d: Screenshot of 23m/s Gust, 16% Turbulence Intensity Wind with a 10yo Child Moving Across the Wind Direction

Item 3:

The GEM criterion is current industry best standard with regards to comparison between measured wind speeds and pedestrian expectation for wind comfort. The utilisation of an annual maximum event as a descriptor for wind comfort is not a suitable reflection on how people will perceive wind conditions on a daily/weekly basis. From our remedial studies we have found that the GEM criterion, which is based on a 5% probability of exceedance has been demonstrated to be more representative of a person's experience. Furthermore, the annual maximum gust criterion has been derived from the 5% mean/GEM criteria and has been formulated around an assumption of a turbulence intensity level applicable to open water approach terrain, not relevant to urban environment such as this development site. Furthermore, the wind speed measurements are also compared with criteria for pedestrian safety, which are based on an annual 3 second gust wind speed that must not exceed 23m/s from any given wind direction.

Item 4:

Study point layouts and criteria for the previously tested Arthur Philip School, Parramatta project (Doc. Ref.: *WC769-01AF04(rev1)- WE Report*) have been included in Appendix B. The result for Point 13 has been presented on the same plot as Point 108 in Appendix A and has also been adjusted to use the Bankstown Airport wind climate data (whereas the previous *WC769-01AF04(rev1)- WE Report* used wind climate data obtained from Sydney Airport).

Item 5:

The test setup and methodology adopted to measure the wind conditions was identical to that of the previously issued Pedestrian Wind Environment report for 5-7 Charles Street & 116 Macquarie Street, Parramatta (Doc. Ref.: *WC837-06F01(rev0)- WE Report*). The proximity model scenario configurations are listed below:

- Existing Scenario: Inclusion of existing building on 5-7 Charles Street & 116 Macquarie Street site, inclusion of Arthur Philip School
- Proposed Scenario: Inclusion of proposed 5-7 Charles Street and 116 Macquarie Street development, inclusion of Arthur Philip School

Study point layouts and criteria for the additional locations Point 109, Point 110, Point 111, Point 112, Point 113 and Point 114 are shown in Figure 2. Point 108 has also been included from the previous testing done as part of *WC837-06F01(rev0)- WE Report*. The results of the testing for the proposed and existing scenarios are shown in Table 1.

The results indicate that there was a minimal variation in wind conditions caused by the subject development on the study areas around Arthur Philip School. The results also showed that the criteria were satisfied. No exceedance of the safety criterion was recorded. Directional plots of the results for the existing scenario are shown in Figure 3a, while the directional plots of the results for the proposed scenario are shown in Figure 3b.

Target Criteria

A.G. Davenport (1972) criterion of 7.5m/s (weekly GEM's) for pedestrian activities, or better than existing conditions.
W.H. Melbourne (1978) criterion of 23m/s (annual gusts) for safety.

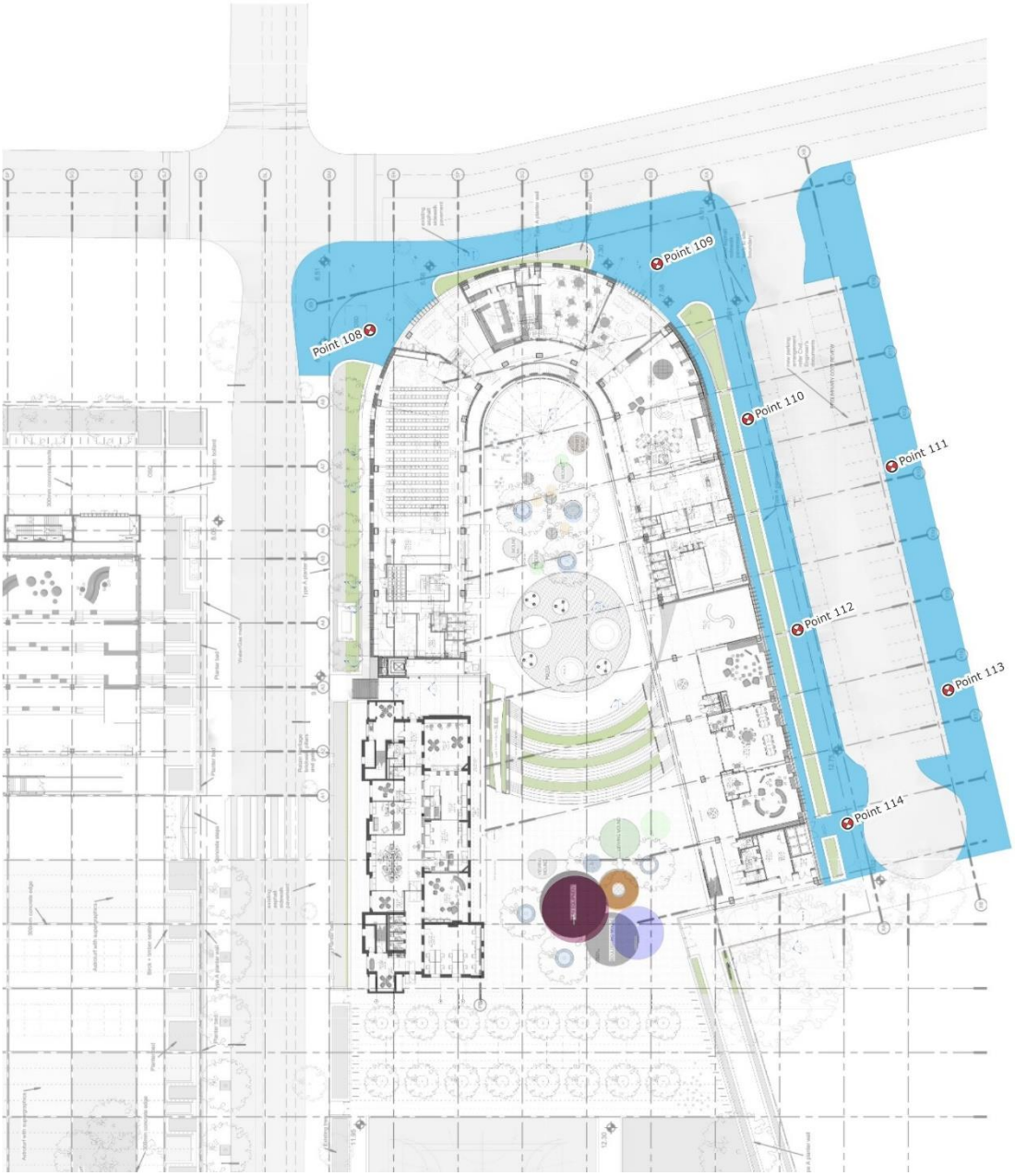


Figure 2: Study Point Layouts and Criteria

Table 1: Wind Tunnel Results Summary

Study Point	Desired Criteria (m/s)		Pass Criteria?	Treatments Required?	Notes
	GEM 5% exceedance	Annual Peak			
Point 108	7.5	23	YES	NO	Within criteria
Point 109	7.5	23	YES	NO	Within criteria
Point 110	7.5	23	YES	NO	Within criteria
Point 111	7.5	23	YES	NO	Within criteria
Point 112	7.5	23	YES	NO	Within criteria
Point 113	7.5	23	YES	NO	Within criteria
Point 114	7.5	23	YES	NO	Within criteria

Figure 3a: Existing Scenario Results Directionality Plot

Figure 3b: Proposed Scenario Results Directionality Plot

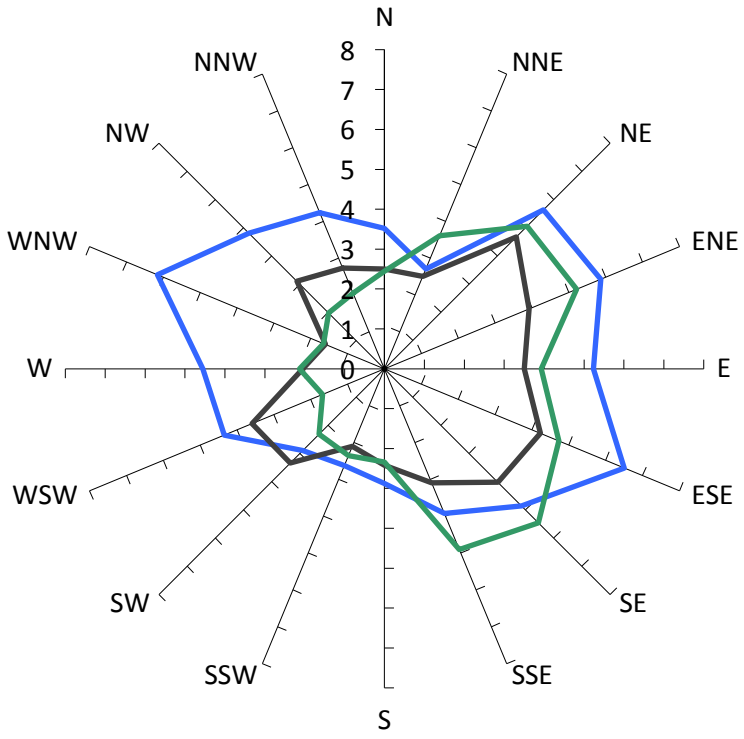
DOCUMENT CONTROL

Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
September 3, 2018	Initial.	0	HK	TR	BU/TR

APPENDIX A

Measured Wind Speeds at Point 108

Weekly Maximum GEM (m/s)



Desired Criterion
7.5m/s

Prob. of Criterion Exceedence (existing site conditions)
0%

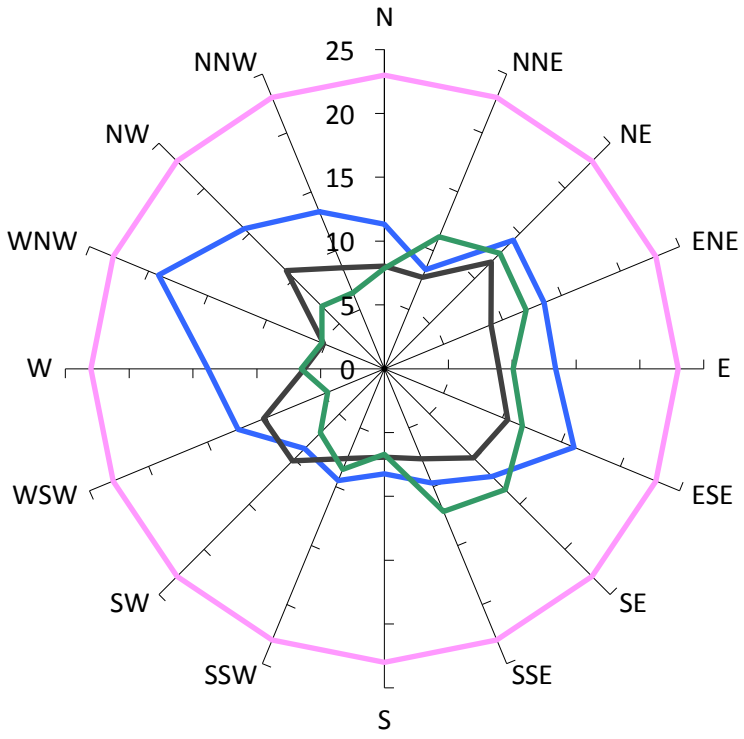
Probability of Criterion Exceedence (initial test)
2%

Probability of Criterion Exceedence (final retest)
N/A

NOTE: The desired criterion is exceeded if the probability of exceedence is greater than 5%

Criterion.
APHS north-eastern main entry, including proposed subject development
APHS north-eastern main entry, including existing subject development
APHS north-eastern main entry, including existing subject development (Point 13 from WC769-01A)

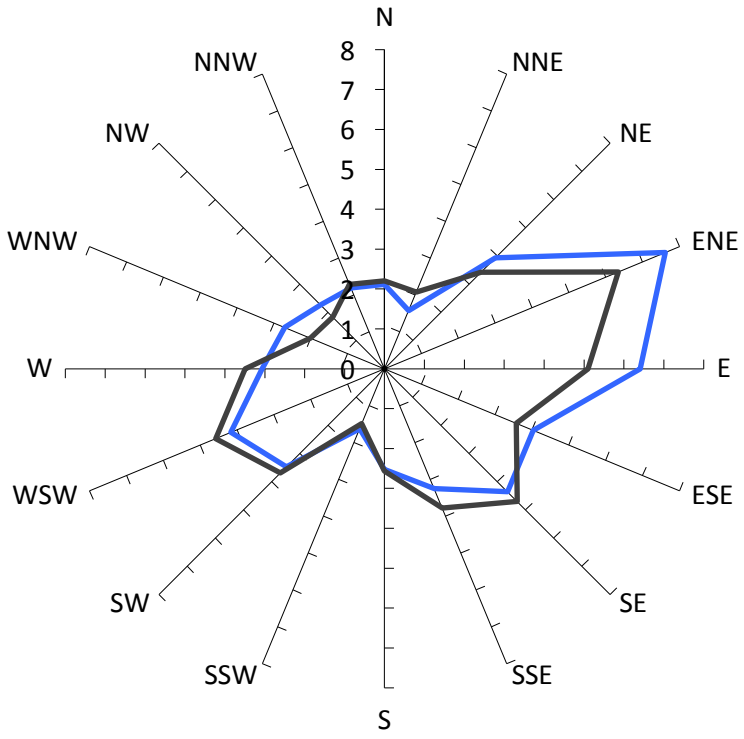
Annual Maximum Gust (m/s)



Desired Criterion
23m/s

Measured Wind Speeds at Point 109

Weekly Maximum GEM (m/s)



Desired Criterion
7.5m/s

Prob. of Criterion Exceedence (existing site conditions)
0%

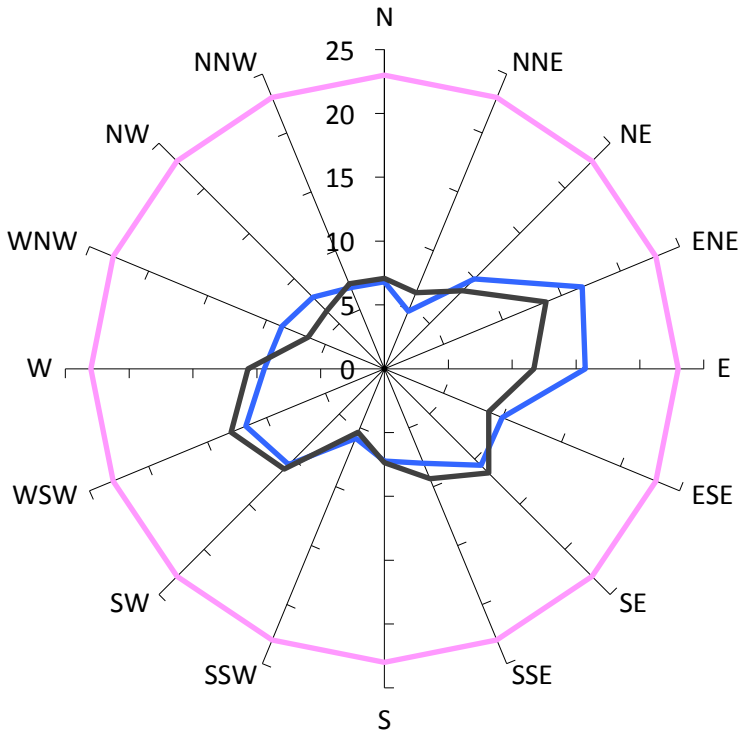
Probability of Criterion Exceedence (initial test)
2%

Probability of Criterion Exceedence (final retest)
N/A

NOTE: The desired criterion is exceeded if the probability of exceedence is greater than 5%

Criterion.
APHS south-eastern main entry and bus zone, including proposed subject development
APHS south-eastern main entry and bus zone, including existing subject development

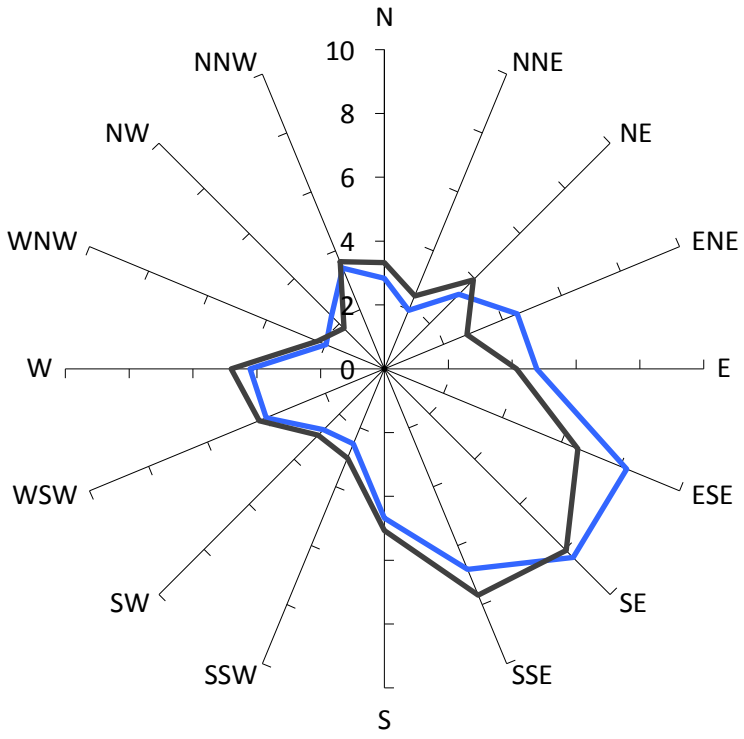
Annual Maximum Gust (m/s)



Desired Criterion
23m/s

Measured Wind Speeds at Point 110

Weekly Maximum GEM (m/s)



Desired Criterion
7.5m/s

Prob. of Criterion Exceedence (existing site conditions)
3%

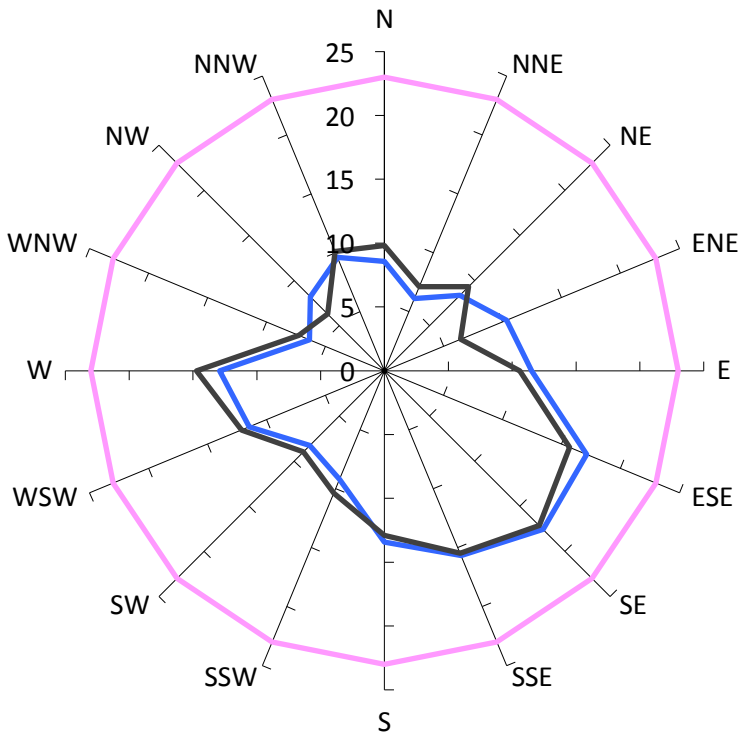
Probability of Criterion Exceedence (initial test)
4%

Probability of Criterion Exceedence (final retest)
N/A

NOTE: The desired criterion is exceeded if the probability of exceedence is greater than 5%

- *Criterion.*
- *APHS northern side of southern drop off zone, including proposed subject development*
- *APHS northern side of southern drop off zone, including existing subject development*

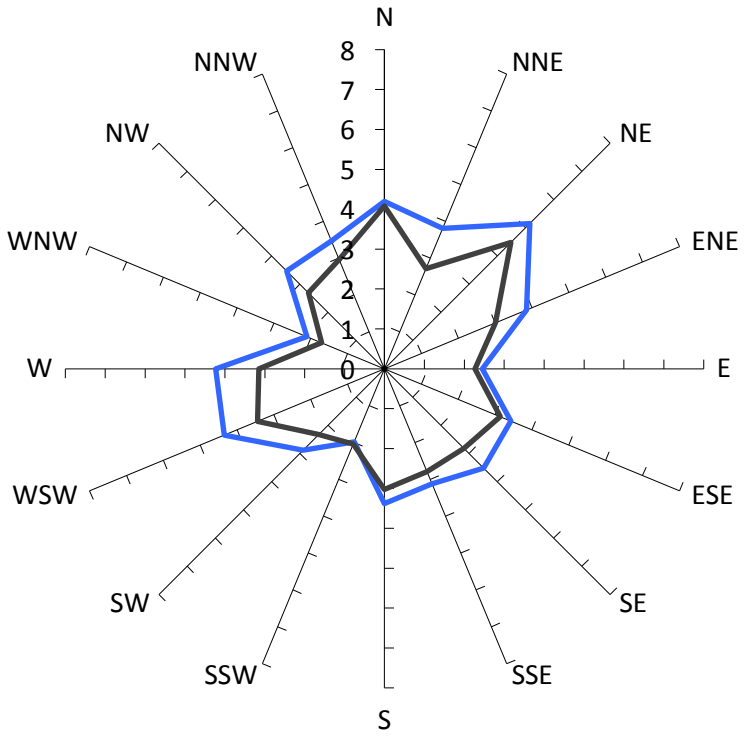
Annual Maximum Gust (m/s)



Desired Criterion
23m/s

Measured Wind Speeds at Point 111

Weekly Maximum GEM (m/s)



Desired Criterion
7.5m/s

Prob. of Criterion Exceedence (existing site conditions)
0%

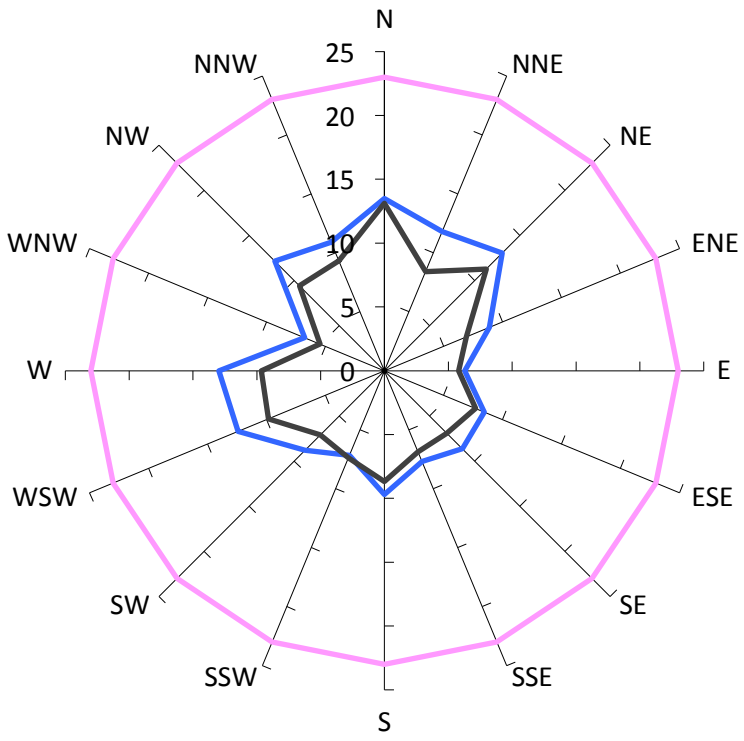
Probability of Criterion Exceedence (initial test)
0%

Probability of Criterion Exceedence (final retest)
N/A

NOTE: The desired criterion is exceeded if the probability of exceedence is greater than 5%

Criterion.
APHS southern side of southern drop off zone, including proposed subject development
APHS southern side of southern drop off zone, including existing subject development

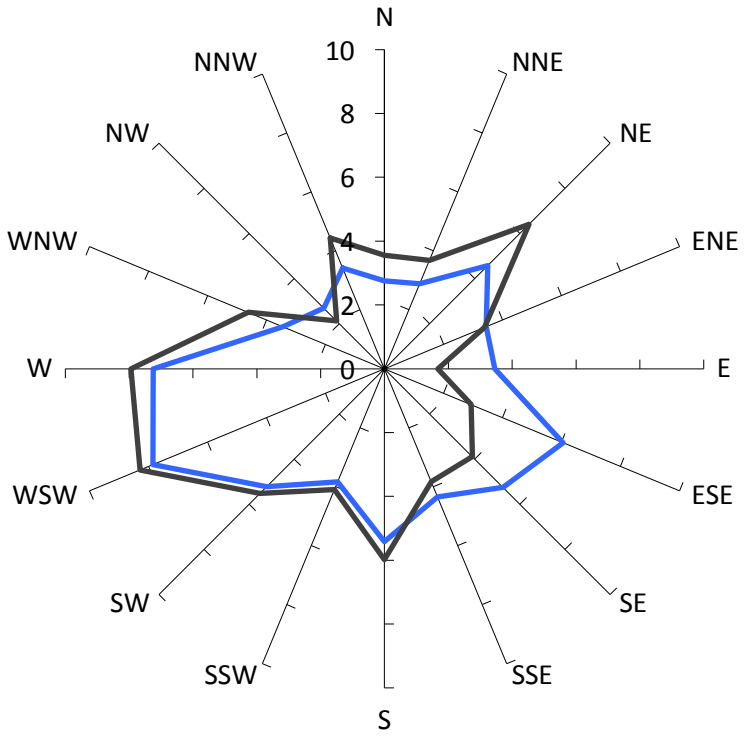
Annual Maximum Gust (m/s)



Desired Criterion
23m/s

Measured Wind Speeds at Point 112

Weekly Maximum GEM (m/s)



Desired Criterion
7.5m/s

Prob. of Criterion Exceedence (existing site conditions)
4%

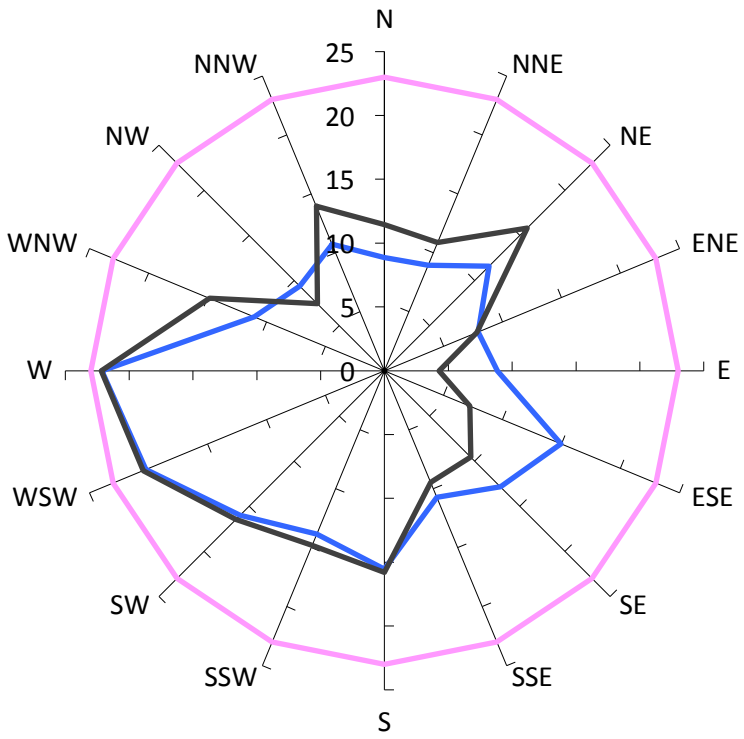
Probability of Criterion Exceedence (initial test)
3%

Probability of Criterion Exceedence (final retest)
N/A

NOTE: The desired criterion is exceeded if the probability of exceedence is greater than 5%

Criterion.
APHS northern side of southern drop off zone, including proposed subject development
APHS northern side of southern drop off zone, including existing subject development

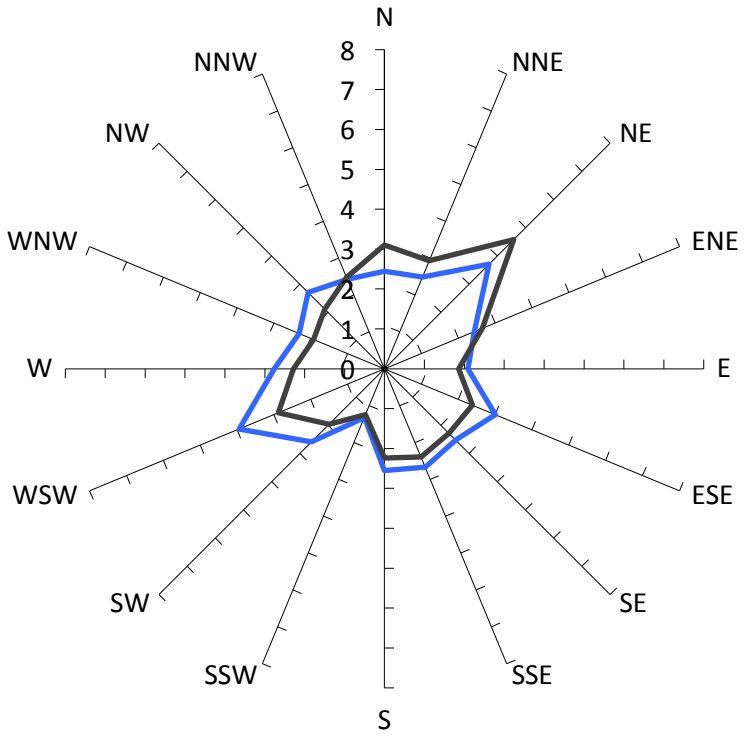
Annual Maximum Gust (m/s)



Desired Criterion
23m/s

Measured Wind Speeds at Point 113

Weekly Maximum GEM (m/s)



Desired Criterion
7.5m/s

Prob. of Criterion Exceedence (existing site conditions)
0%

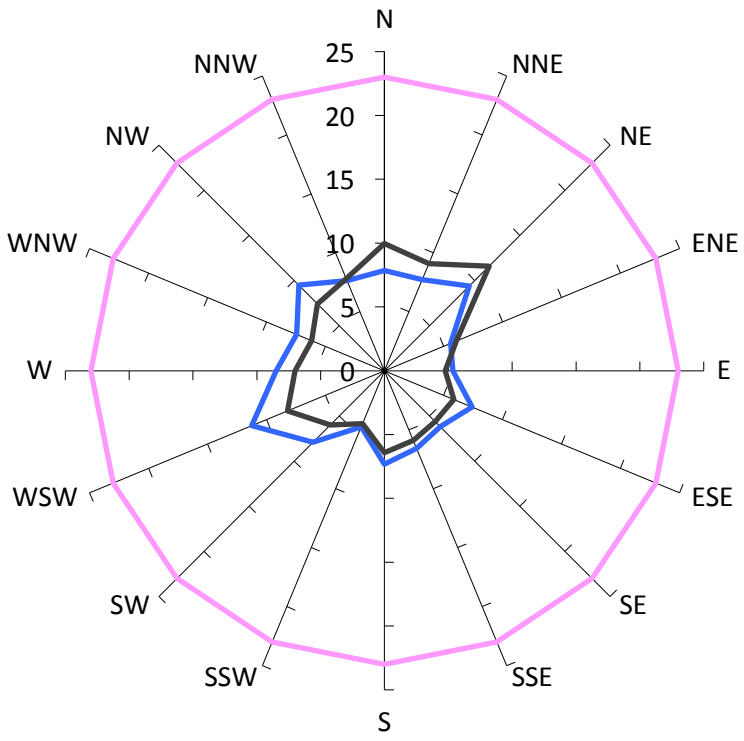
Probability of Criterion Exceedence (initial test)
0%

Probability of Criterion Exceedence (final retest)
N/A

NOTE: The desired criterion is exceeded if the probability of exceedence is greater than 5%

Criterion.
APHS southern side of southern drop off zone, including proposed subject development
APHS southern side of southern drop off zone, including existing subject development

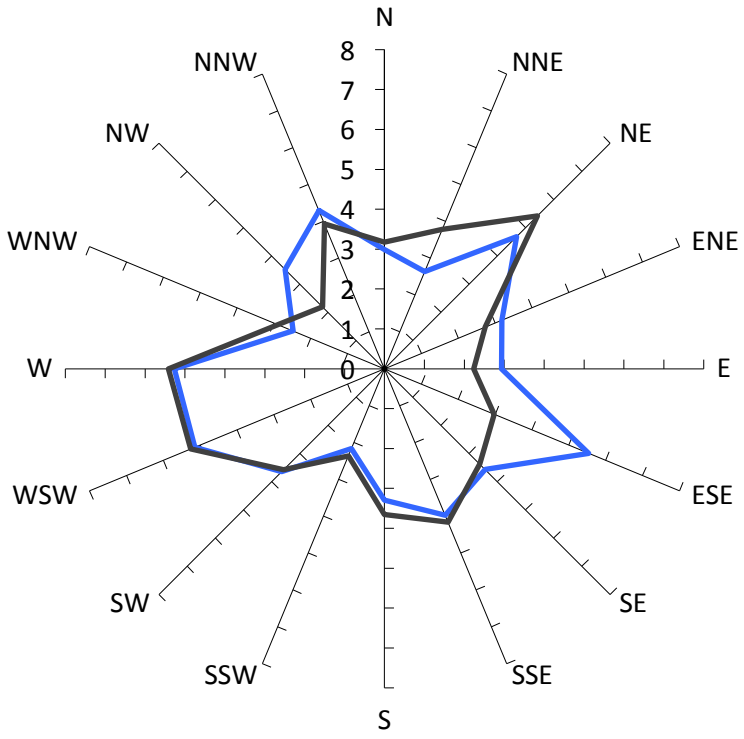
Annual Maximum Gust (m/s)



Desired Criterion
23m/s

Measured Wind Speeds at Point 114

Weekly Maximum GEM (m/s)



Desired Criterion
7.5m/s

Prob. of Criterion Exceedence (existing site conditions)
1%

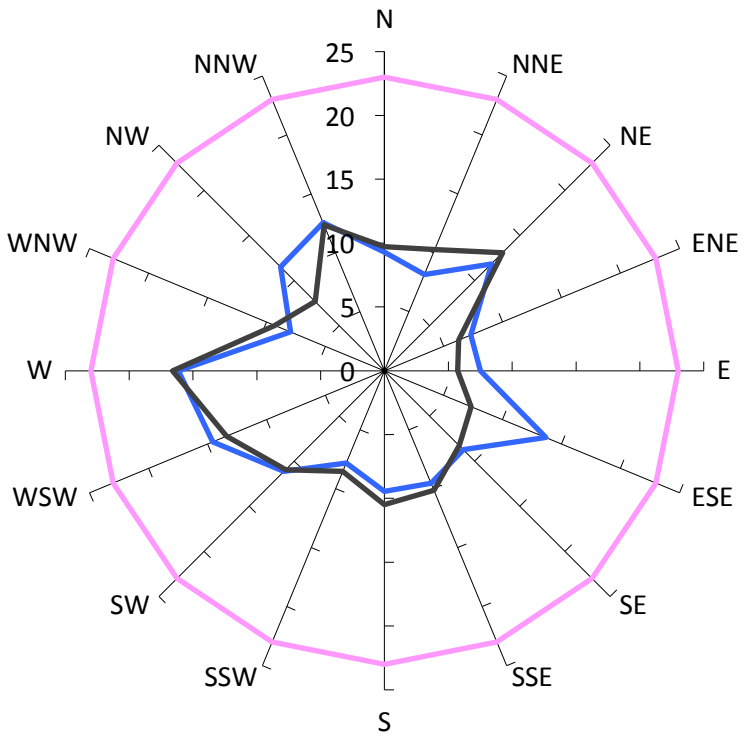
Probability of Criterion Exceedence (initial test)
1%

Probability of Criterion Exceedence (final retest)
N/A

NOTE: The desired criterion is exceeded if the probability of exceedence is greater than 5%

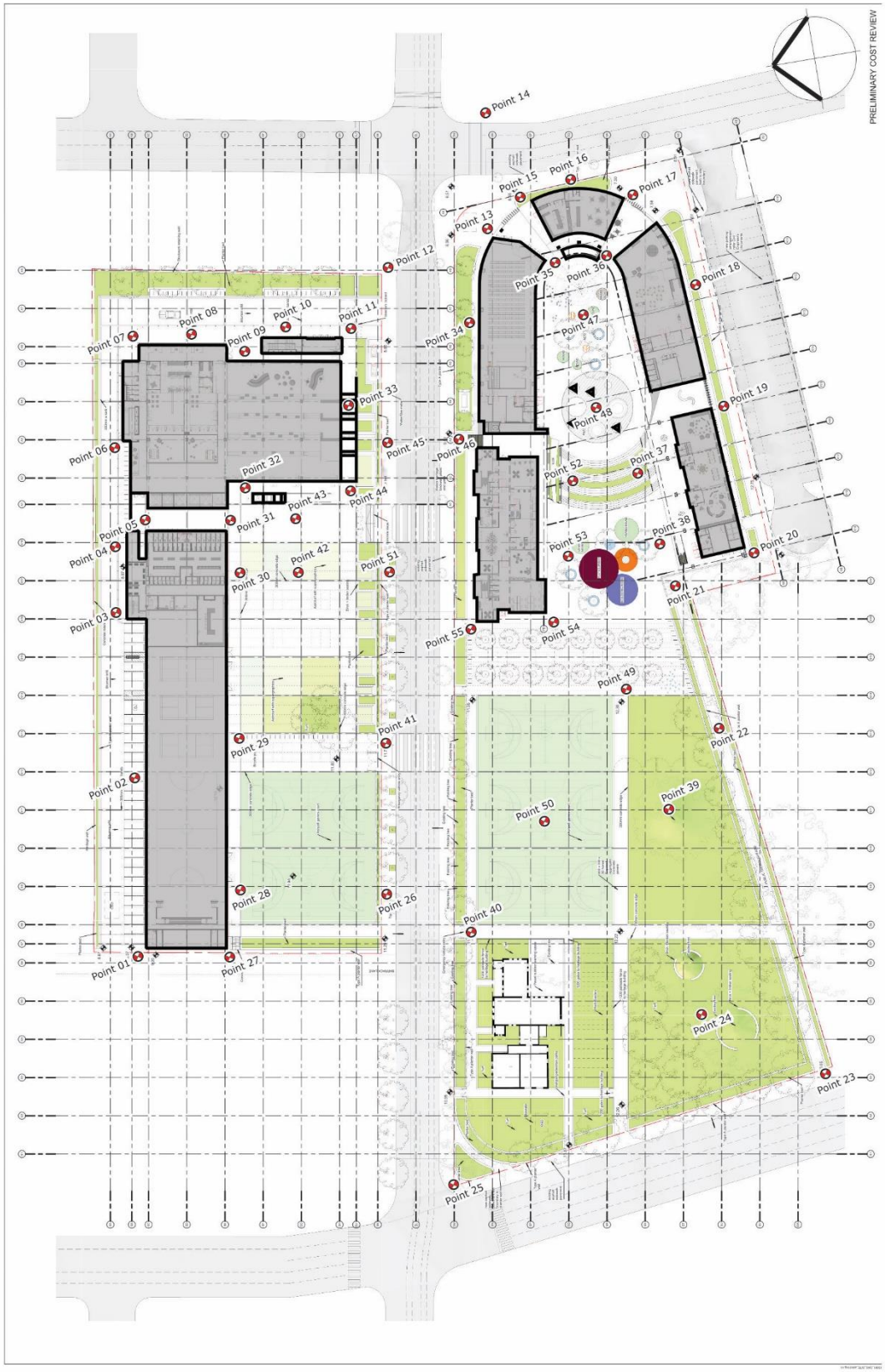
Criterion.
APHS northern side of southern drop off zone, including proposed subject development
APHS northern side of southern drop off zone, including existing subject development

Annual Maximum Gust (m/s)



Desired Criterion
23m/s

APPENDIX B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