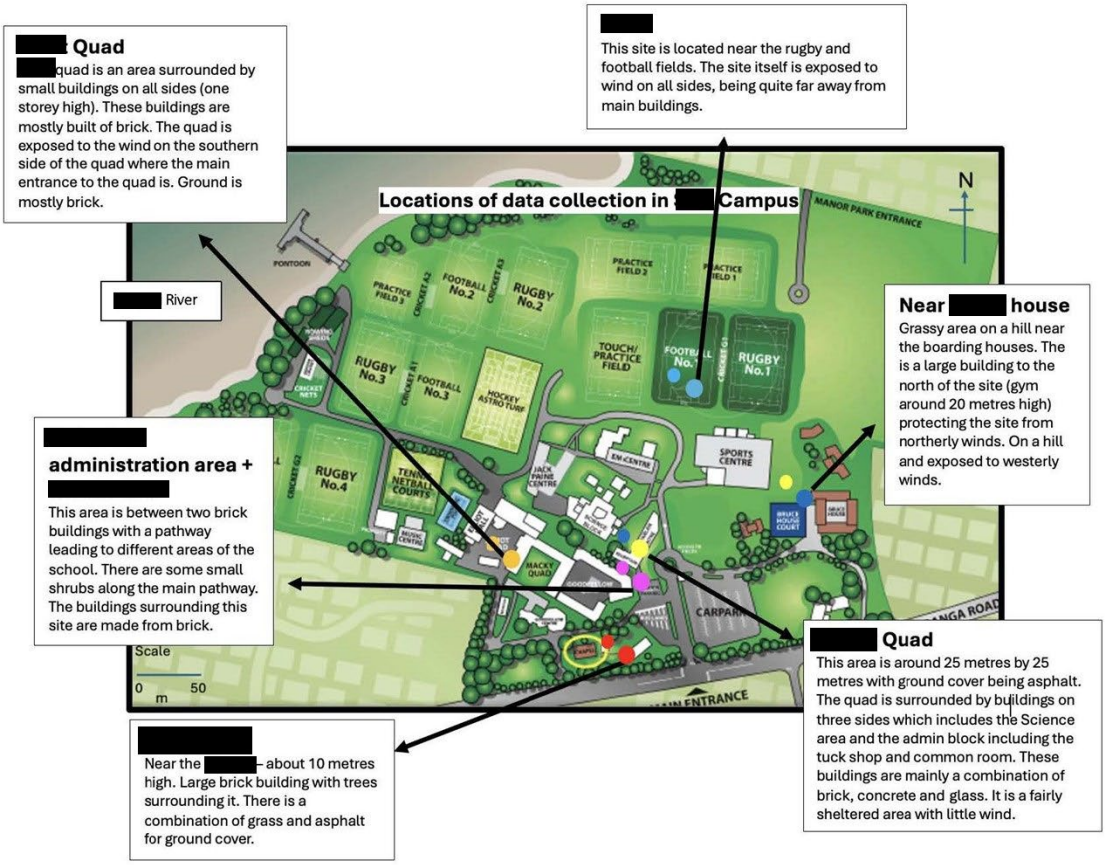
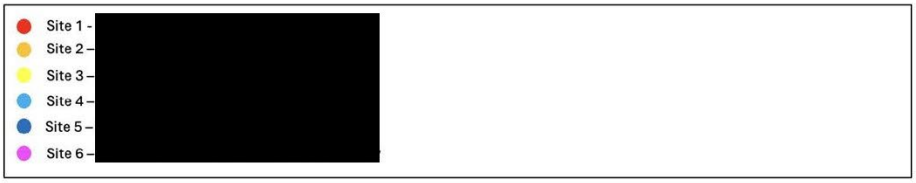
Merit

NZQA Intended for teacher use only



Data 1 – Annotated Map

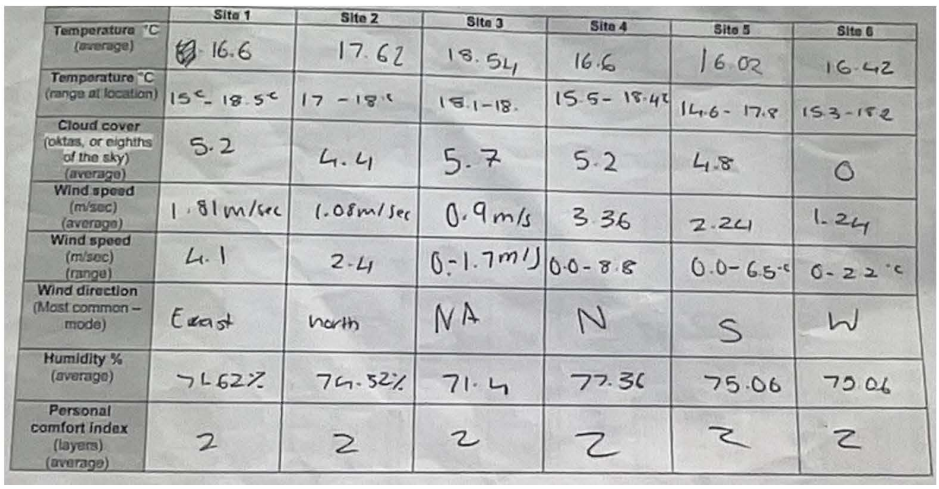


The above map displays the different areas in the campus where data was collected for this assessment. As you can see, the campus includes roads, buildings and fields, with a

close proximity to the Tamaki River. The fields are located north of the campus, while most buildings are south.

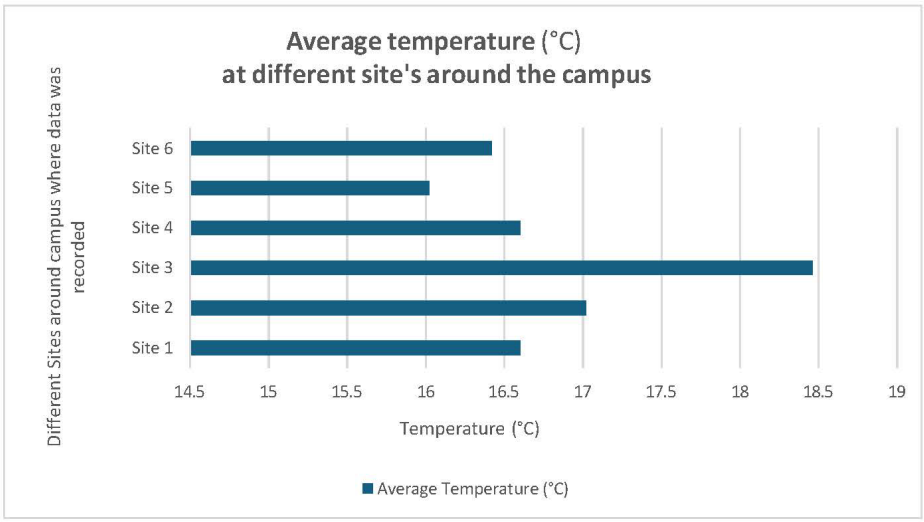
To measure the data, we used two different types of field equipment. The first was a UT363 BT Mini Anemometer and thermometer, which was used to measure wind speed and temperature. The second device, UT333BT Temperature and Humidity Meter, measures humidity and temperature.
At the different locations, we used these instruments to record the data.

Summary Table of Data collected:



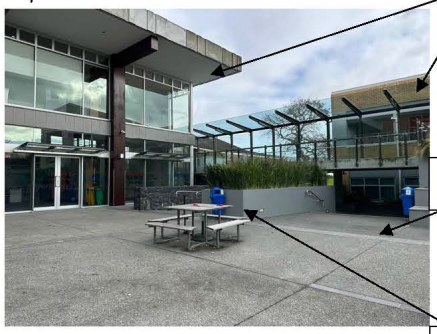
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Temperature °C (average)	16.6	17.62	18.54	16.6	16.02	16.42
Temperature °C (range at location)	15°- 18.5°	17 - 18°	18.1-18.	15.5- 18.4°	14.6- 17.8	15.3-18.2
Cloud cover (oktas, or eighths of the sky) (average)	5.2	4.4	5.7	5.2	4.8	0
Wind speed (m/sec) (average)	1.81m/sec	1.08m/sec	0.9m/s	3.36	2.24	1.24
Wind speed (m/sec) (range)	4.1	2.4	0-1.7m/s	0.0-8.8	0.0-6.5°	0-2.2°
Wind direction (Most common – mode)	East	north	NA	N	S	W
Humidity % (average)	71.62%	74.52%	71.4	77.36	75.06	75.06
Personal comfort index (layers) (average)	2	2	2	2	2	2

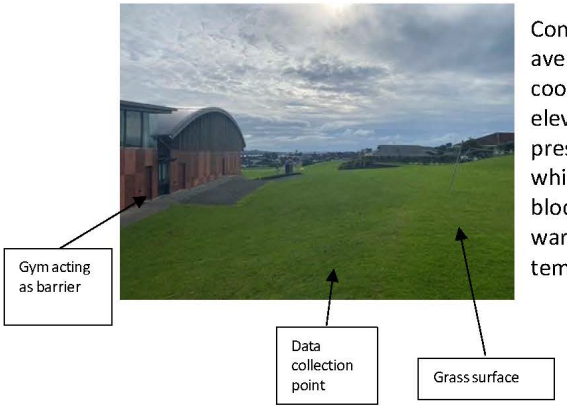
Data 2 – Temperature



The graph above displays the variation of average temperature at 6 different sites around the campus.

For temperature, site 3 (quad) has the highest average of 18.46°C. This is notably warmer compared to the other sites. This higher temperature could be influenced by geographical features like the fact that it has more protection from wind. This is because the quad is surrounded by buildings on three sides which includes the Science area and the admin block including the tuck shop and common room. These structures reduce wind exposure, thereby contributing to slightly higher average temperatures compared to other sites on the SKC campus.





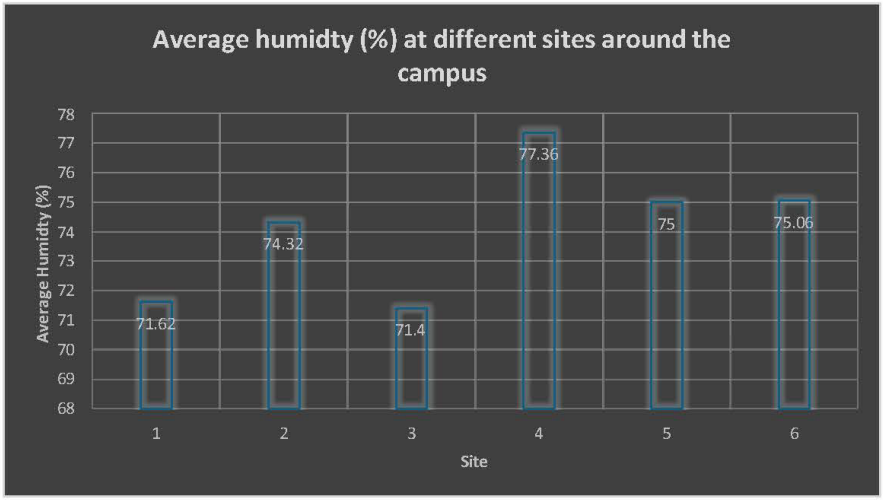
Conversely, site 5 (near house), has the lowest average temperature at 16.02°C, demonstrating a cooler environment. Site 5 experiences higher elevation and is exposed to southerly winds. The presence of a large building to the west (the gym, which is around 20 meters high) acts as a barrier, blocking westerly winds that could possibly bring warmer air. This therefore maintains cooler temperatures at the house site. Instead, cool

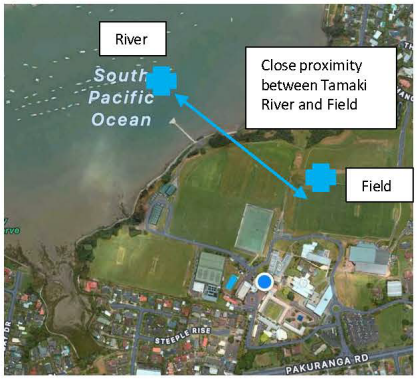
southerly winds from areas like Antarctica could be influencing the overall temperature of the site.

The surfaces of the ground also contribute to the temperature at different sites. With the quad being primarily made up of dense concrete and rock, it absorbs the solar radiation from the sun during the day. This contributes to an increased surface temperature of the concrete, which can lift the overall air temperature above it. This explains why areas with concrete ground surfaces like the quad can contribute to higher temperatures.
On the other hand, grass has a high degree of reflectivity (albedo), meaning that it reflects more solar radiation away from it's surface, resulting in less absorption of heat compared to concrete. As a result of this, air temperatures around grass surfaces like the field remain cooler.

Sites 1,4, and 6 display intermediate temperatures from 16.6°C to 16.42°C with a range of 0.18°C. This proposes more uniform conditions.

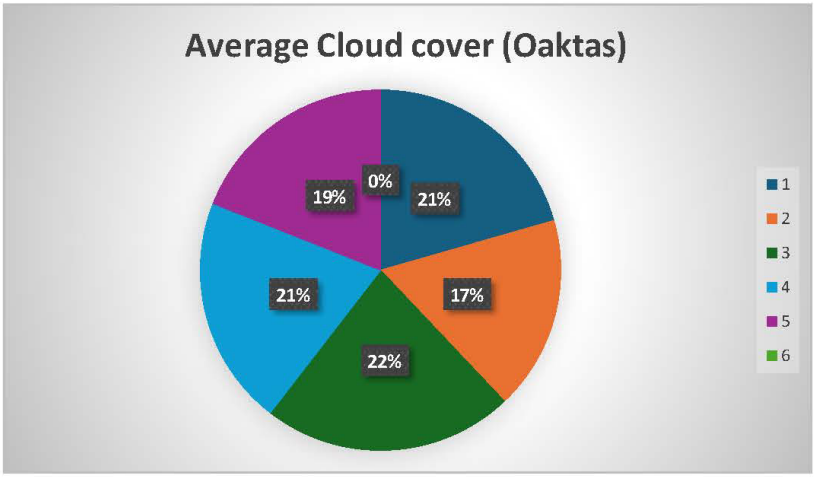
Data 3 – Humidity

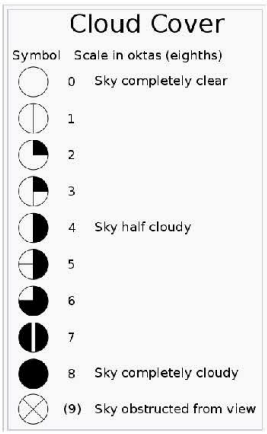




The graph above shows the average humidity (%) at the different sites around the campus.
Site 4 (Field) records the highest average humidity at 77.36%. A factor that could contribute to this is its close proximity to the Tamaki River. Large bodies of water like the Tamaki river are constantly evaporating moisture into the air surrounding. This in turn impacts the overall humidity in the area as there is an increase of moisture in the air.
The fairly cold average temperature of site 4 (16.6°C), also contributes to increased humidity. This is because colder temperatures usually lead to the condensation of water vapour in the air, increasing humidity levels.
Site 3 (Quad) records the lowest average humidity at 71.4%. This is a significant difference of 5.96 between the highest and lowest humidity.
There are many reasons as to why this particular site does have the lowest average humidity, one of which being a lot further from all other sites from a body of water such as the Tamaki river. This means that there is not as many sources which contribute to moisture to the air, therefore resulting in lower humidity.
Other potential reasons can be due to site 3's topography. Topography in simple terms describes the sites situation, elevation and land pattern. Areas with less vegetation such as quad contributes to its lower humidity due to faster drying of the air.
Also, site 3 is known to be a region in which encounters a lot of winds. These winds bring in dry air from inland or regions of lower humidity.
While a specific temperature for site 3 is not known, colder temperatures can also play a vital role in the lower humidity due to a reduced capacity of the air to hold moisture.

Data 4 – Cloud Cover





This average cloud cover (oktas) shows the variability of sky conditions across 6 different sites across the campus. It has been put in the form of a pie graph.
As can be seen, site 3 (quad) is shown to have the highest average cloud cover at 5.7 oktas. This higher cloud cover suggests that site 3 sees more frequent and thicker clouds compared to other sites investigated here. This could be due to how sheltered the area is. The quad being surrounded with buildings can create microclimate conditions, favourable for cloud formation. Orographic lifting can also occur due to the quad having low-elevation. This is when the moist air is forced to go over/rise over higher surrounding buildings, adiabatically cooling and condensing, creating clouds.

On the other hand, site 6 (Between XXXXX and Admin area) shows 0 average oktas, indicating no visible cloud cover. This could be due to several factors such as its again, geographical position in rain shadow or if it's under the influence of dry air masses from nearby high pressure system. Site 6 experiences slightly more stable atmospheric conditions like temperature and humidity, resulting in clearer skies and minimal cloud formation.
Sites with moderate cloud cover, which are sites 1,4 and 5, range from 4.4 to 5.2 oktas, suggest a balanced mix of cloudiness varies depending on seasonal and daily weather patterns.

Conclusion

The initial aim of this research was to find out whether there is spatial distribution across the college campus. Over the 5 days of data collection, it is evident that weather indicators like the ones I investigated including temperature, humidity and cloud cover, all exhibit variations across different areas of the school environment, therefore reflecting varying degrees of spatial distribution .
The annotated map provided shows us the buildings and land formations that contributes to weather indicators at each site.
The temperature shows significant differences, with site 3 (quad) recording the highest average temperature due to its very sheltered position and concrete surface that absorbs more solar radiation. The site with the lowest recorded temperature was site 5 (near house). This is likely influenced by its higher elevation and exposure to southerly winds.
Humidity levels show much variation as well, with site 4 (field) displaying the highest average humidity of 77.36%. This is attributed to its close proximity to the Tamaki river and colder temperatures. Site 3 (Quad), shows the lowest average humidity of 71.4%, due to its distance from water sources and exposure to dry winds.
Site 3 indicates the highest average cloud cover of 5.7 oktas. Showing a frequent clod formation in it's sheltered microclimate.
In conclusion, this research illustrates how local geographical features , such as temperature , humidity, and cloud cover have a profound effect on spatial distribution across the campus and we can directly see, through analysis of data collected the differences in the campus environment.
We can also see how structures create microclimatic variations that influence weather indicators across the campus.

Strengths

The findings of my data that I have presented has strengthened my understanding of spatial variation of weather across the school campus. By measuring different weather indicators like temperature, humidity and cloud cover at different locations, the differences between microclimates become clear. For example, areas like Quad that are sheltered by buildings display higher temperatures. For me, this highlights the impact of built environments on local climate. Similarly, different humidity levels at inland sites versus sites closer to the water sources influence humidity levels. This analysis enhances my insight into how microclimatic factors influence weather patterns withing a confined geographical area like our school campus.

Limitations

The data I have presented also has limited scope for understanding spatial variation of weather across the school. One limitation is that the data collection duration was relatively short (5 days). This doesn't capture seasonal variations or long term weather patterns. Also, the amount of different measurement points (6) doesn't fully represent the diversity of microclimates across the entire school campus. Limitations like this suggest that while the

data offers a small snapshot, a more comprehensive and extended study would provide a better understand of spatial weather variation at the campus.

Additional Data

Additional data could be used to improve my understanding of the spatial variation in weather across the school. This could include long-term monitoring and extending the data collection over more seasons would capture seasonal trends and variability, providing more insight .
Secondly, ensuring that the measurements were taken at the same time of day would help provide more precise data, improving variables within the data.
Altogether, this would provide a strong understanding of the school enviroment.