ENGSCI 773 - Site Assessment Report (10%)

Due date: 11:59 PM - 22/03/2023

Optional lab/drop-in clinic: 3-5 pm on 14/03/2023 in ENGSCI computer labs (439-427 and 439-433)

Aims

- Understand the various geospatial data resources available in New Zealand and demonstrate their use
- Find, access and use relevant meteorological data from New Zealand
- Understand how to use the Global Wind Atlas and download model results
- Choose a suitable wind turbine site given the assignment brief, meteorological data, and model output from the Global Wind Atlas
- Consider relevant site selection factors
- Compare selected site with other team members to make a justified recommendation

Description

Recent storm events have highlighted the importance of having energy sources that are independent of the national grid which can be used in times of power outages, as well as normally supplementing the grid generation. Auckland Council is investigating the possibility of installing turbine/battery units at various community locations around Auckland to meet this need. They have requested a report comparing possible sites for these units.

Your group is tasked with writing a site assessment report. Each group member is required to prepare an individual written report on a potential site for a turbine/battery unit. Then, as a group, you must prepare a written summary report that compares the potential sites and presents a justified recommendation on the preferred location for a turbine/battery unit.

The individual report should include (but is not limited to):

- A description of the selected site
- A discussion of wind resource availability at the selected site, including a comparison/discussion of measured meteorological data sourced from CLIFLO against model results from the Global Wind Atlas
- A discussion of the factors considered during the site selection process

The group report should include (but is not limited to):

- A brief summary of all sites considered
- A recommendation on the preferred site
- A detailed discussion of the rationale behind your recommendation

Note: This assignment is concerned with early project site selection rather than turbine design. As such, you are not required to suggest appropriate turbine sizes or power output. The target design conditions are given below.

Additional Specifications:

- Auckland Council has provided detailed geospatial data (in the form of KML files) detailing possible site locations. These include:
    - Schools and hospitals
    - Public parks
    - Crown land
- Auckland Council has requested the following areas to be excluded:
    - Great Barrier and Little Barrier

    - Anything outside of Auckland Council's administrative area
- Auckland Council requires the site to be suitable for a turbine with a hub height of 10 m and a target average wind speed of 4 – 8 m/s.

Resources and helpful hints

- Geospatial data is provided
    - Google earth pro (free – also available on ENGSCI lab computers) can be used to view these. Google earth online works – but it can be a bit slow/laggy.
    - More geospatial data is available online if required (see LINZ and Auckland Council websites)
- A Python script is provided to help with the analysis and plotting of the meteorological data and Global Wind Atlas model results
    - A Conda environment has been provided, however all packages can also be installed via pip if you don't use an environment manager
    - Feel free to modify and make your own plots/comparisons
- Remember to consider the effective roughness length of your chosen area
- The smaller scale of the proposed turbine means that some of the factors that are relevant to large scale wind farms are not necessarily applicable (e.g., transport constraints). Try to consider relevant proxies (e.g., ease of access for users and maintenance).
- Download CLIFLO meteorological data as a .csv file

Submission requirements

You are each expected to submit:

- The individual report: 2 pages maximum, 2 cm margins, 11pt, Times New Roman, pdf format (7%)
- The group report: 1 page maximum, 2 cm margins, 11pt Times New Roman, pdf format (3%)
- Both reports should not include appendices

You must also submit an additional zip file, which includes:

- Generalised wind climate (GWC) file (.lib) for your selected site
- CSV data file sourced from CLIFLO database used in your comparison
- Google Earth printout/screenshot showing the provide geospatial data, your selected turbine site and location of the data source(s)

Please name your zip file using your UPI and give both reports sensible file names.