Week 3 Assignment: Site Suitability Analysis Tutorial

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In this week's assignment, we analyze suitable sites for a wind energy company to install high-efficiency wind turbines. In the tutorial we follow this week (*Perform a Site Suitability Analysis for a New Wind Farm*, n.d.), a Colorado-based company is looking for sites which are located in Colorado, are in counties with populations above 20,000, are in high-wind areas, are close to power lines, and are close to other wind farms. We will get into detail about the specific criteria which is requested later on in the report, but we will find this sites to report back to the Colorado-based wind farm company which sites they can begin to explore.

Conduct a Site Suitability Analysis

In the first section of the tutorial, we load the map data, . In the tutorial we're instructed to open a web app but I wanted to become more familiar with the desktop application of ArcGIS Pro itself, so I chose to open the data in ArcGIS Pro on my desktop.

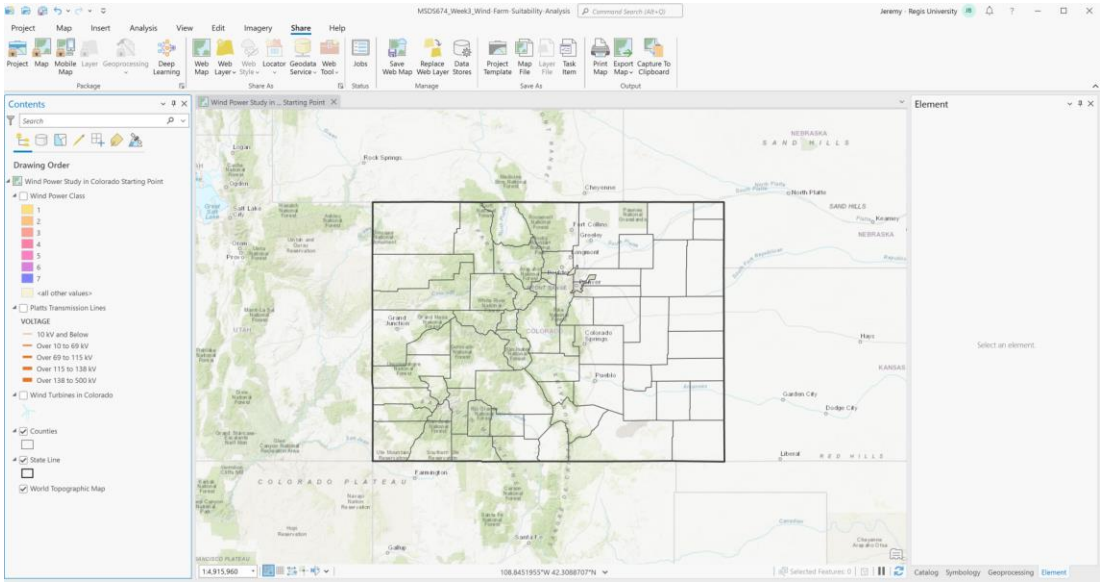

Figure 1: Initial Map after Loading in ArcGIS Pro

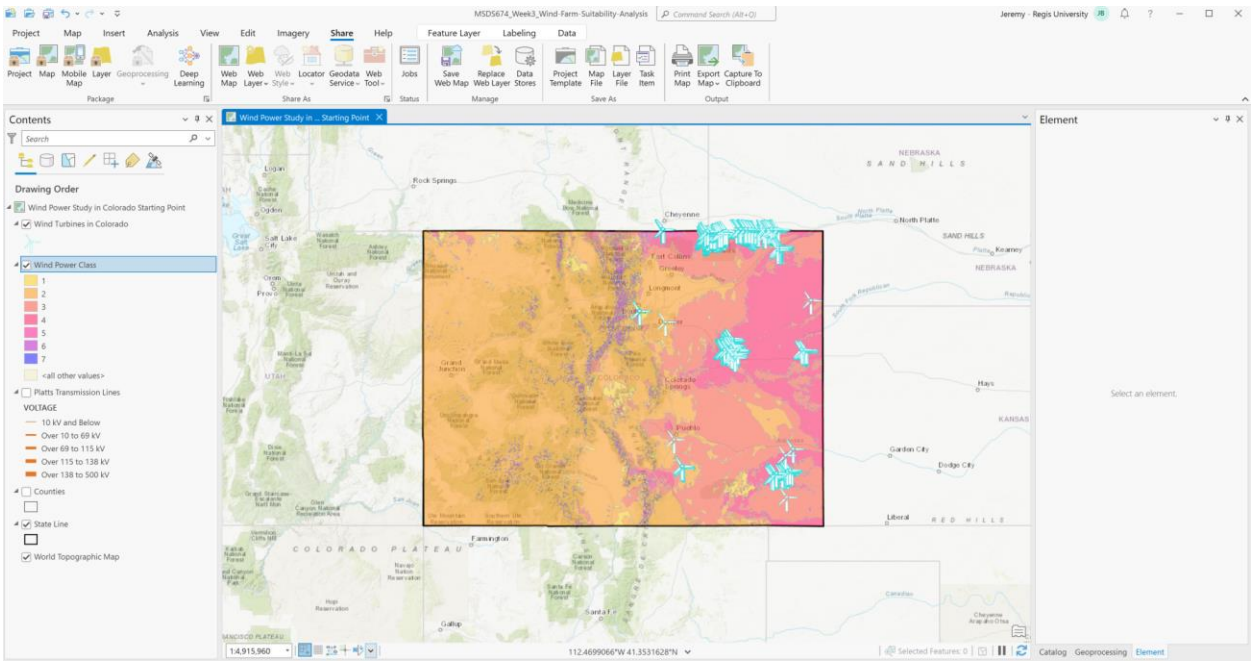

Figure 2: After turning Wind Power Class and Wind Turbines layers on

Wind power class	Wind power density10 m (33 ft.)	Speed10 m	Speed33 ft.	Wind power density50 m (164 ft.)	Speed50 m	Speed164 ft.
1	100	4.4	9.8	200	5.6	12.5
2	150	5.1	11.5	300	6.4	14.3
3	200	5.6	12.5	400	7.0	15.7
4	250	6.0	13.4	500	7.5	16.8
5	300	6.4	14.3	600	8.0	17.9
6	400	7.0	15.7	800	8.8	19.7
7	1000	9.4	21.1	2000	11.9	26.6

Figure 3: Table for Interpretation of Wind Power Class

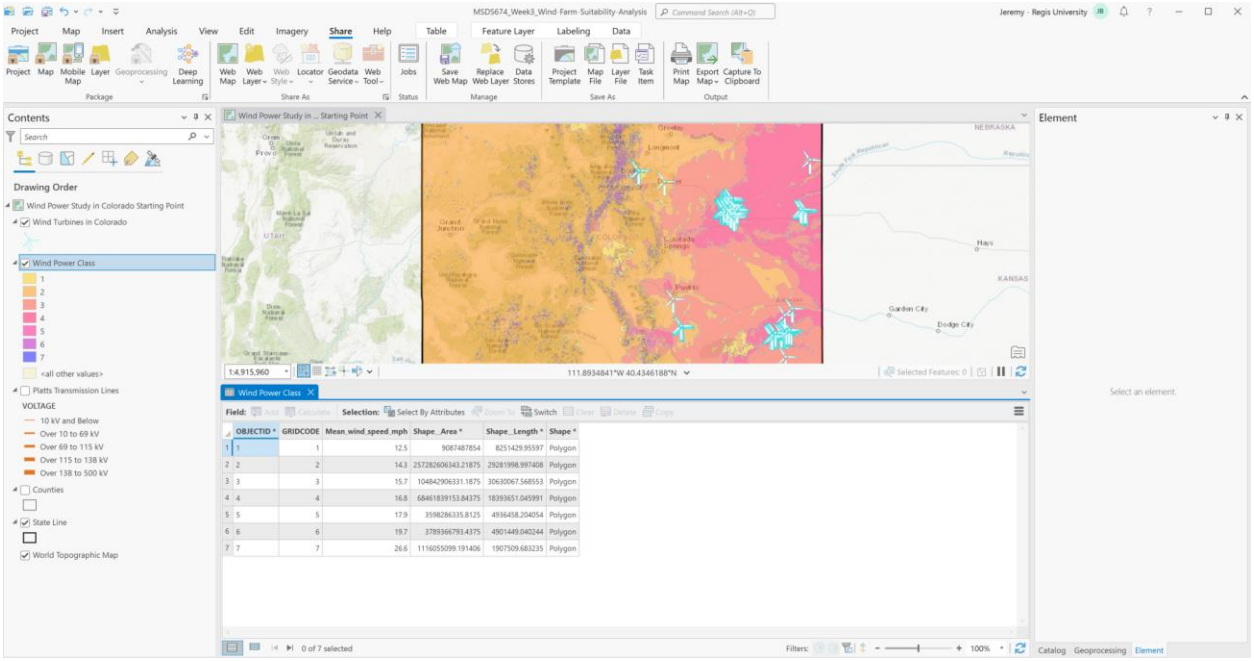

Figure 4: Attribute Table of Wind Power Class

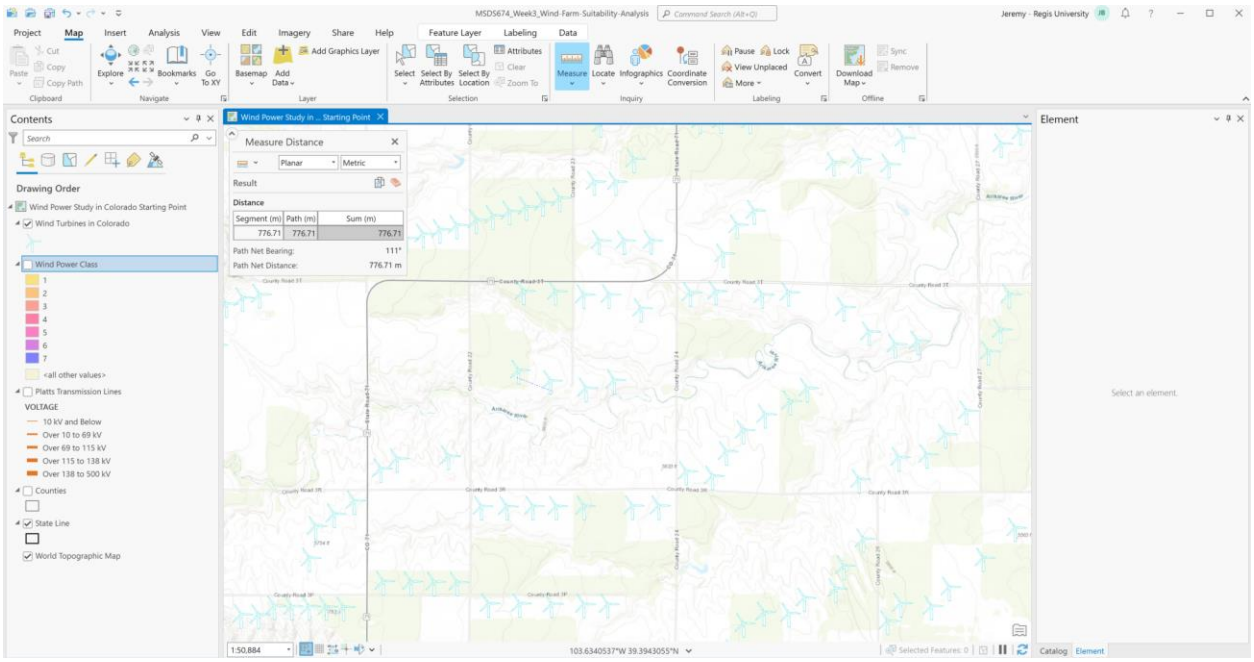

Figure 5: Measuring Different Wind Turbine Distances

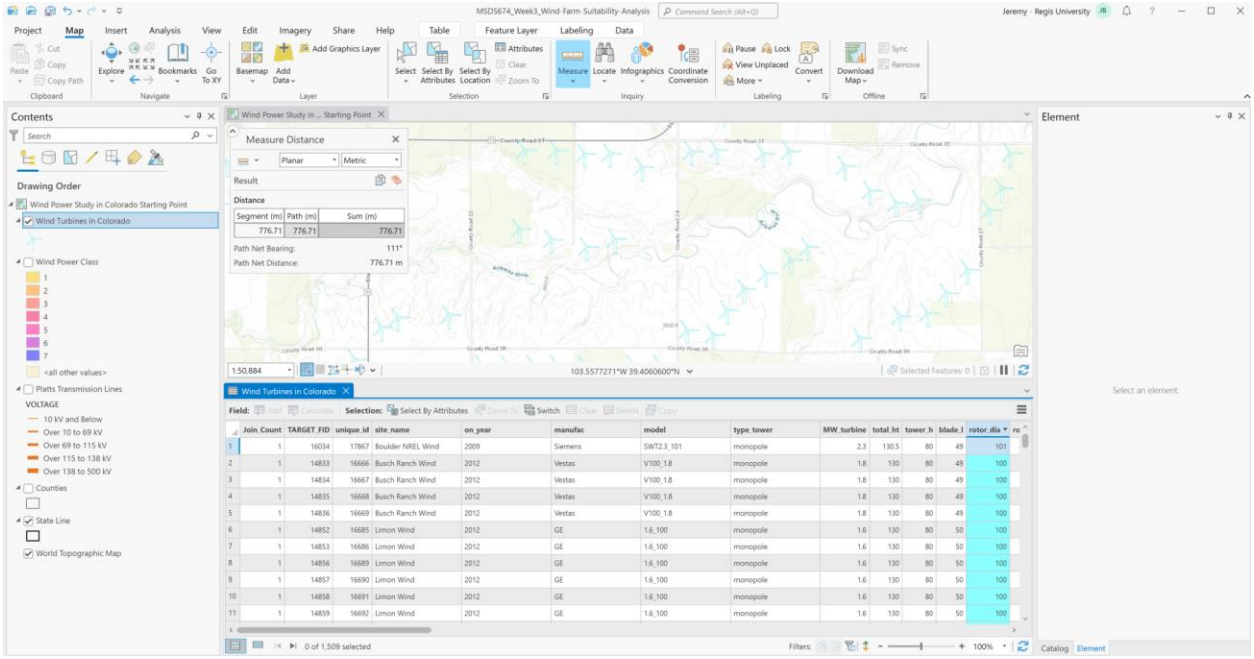

Figure 6: Sorting Wind Turbine by Rotor Diameter, Descending

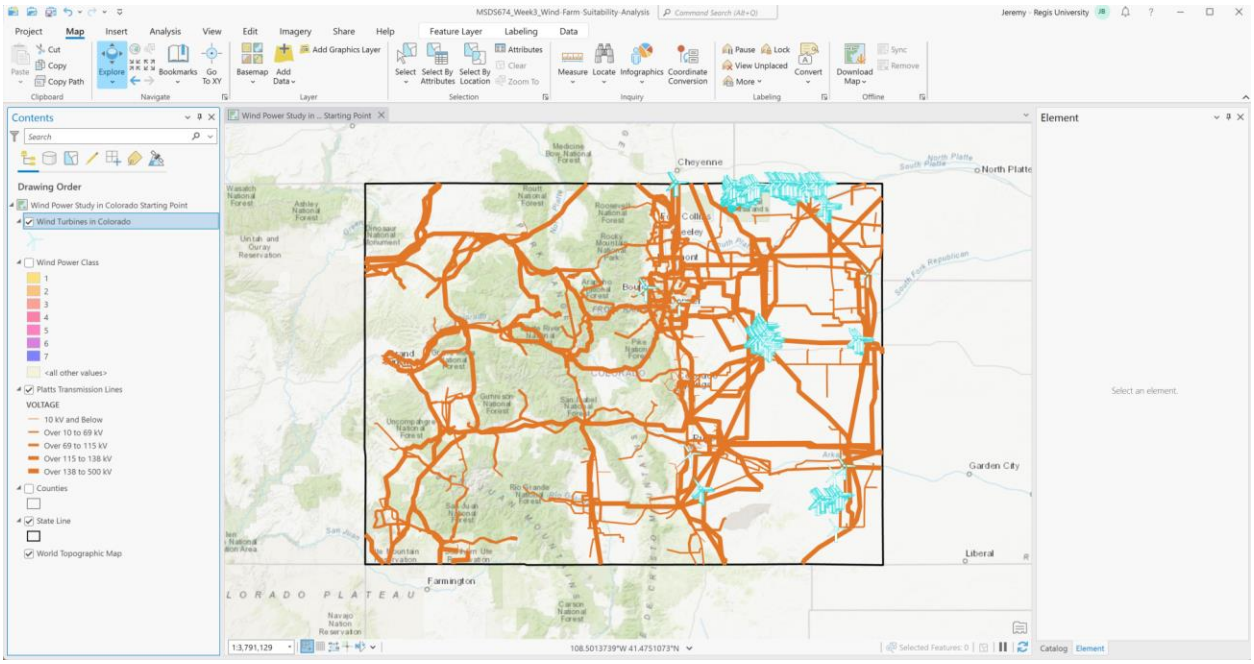

Figure 7: Turning On Platts Transmission Lines

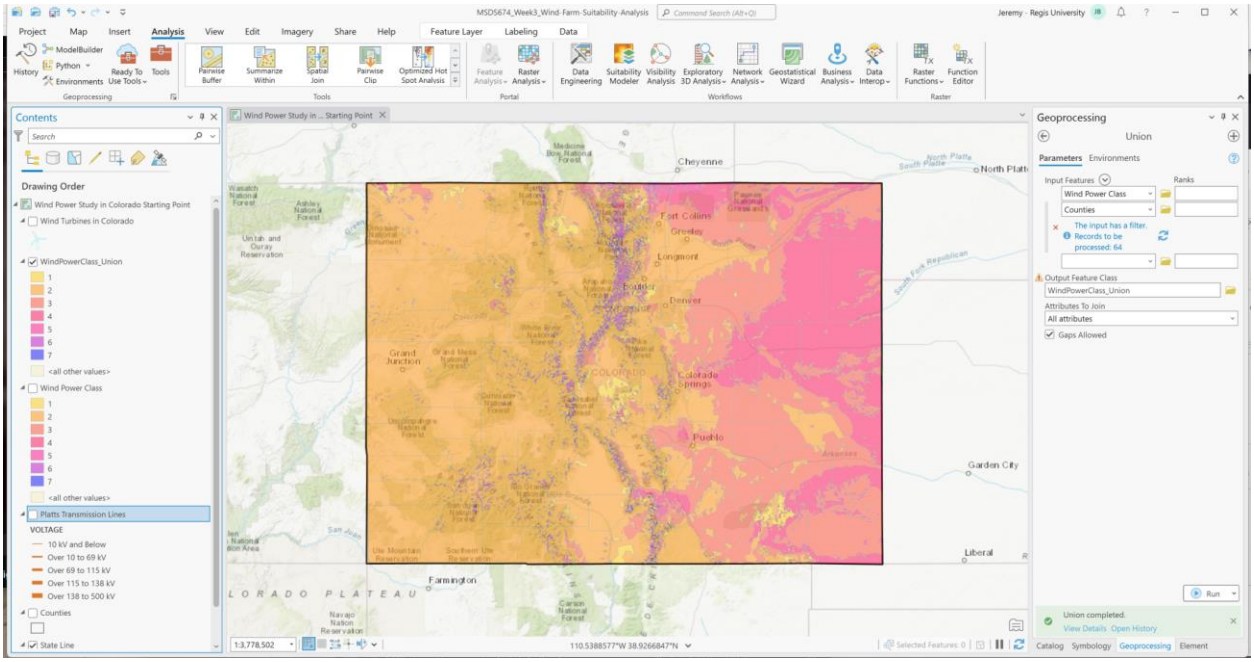

Figure 8: After creating the Union feature

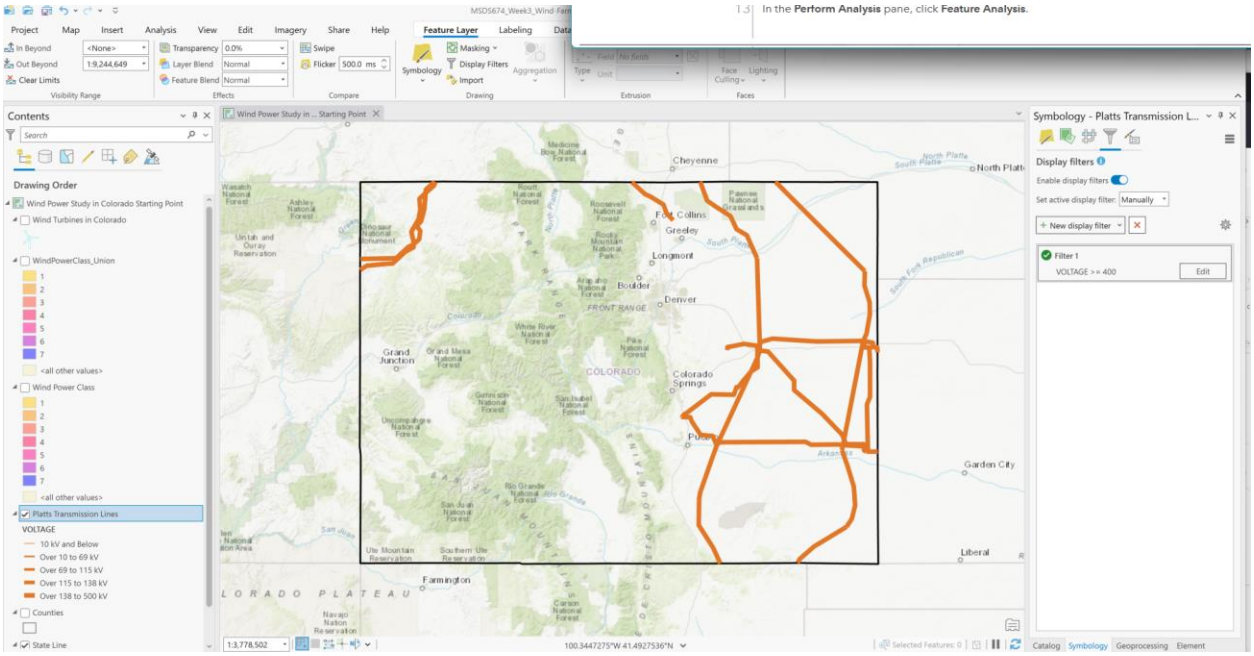

Figure 9: After applying the filter of VOLTAGE >= 400

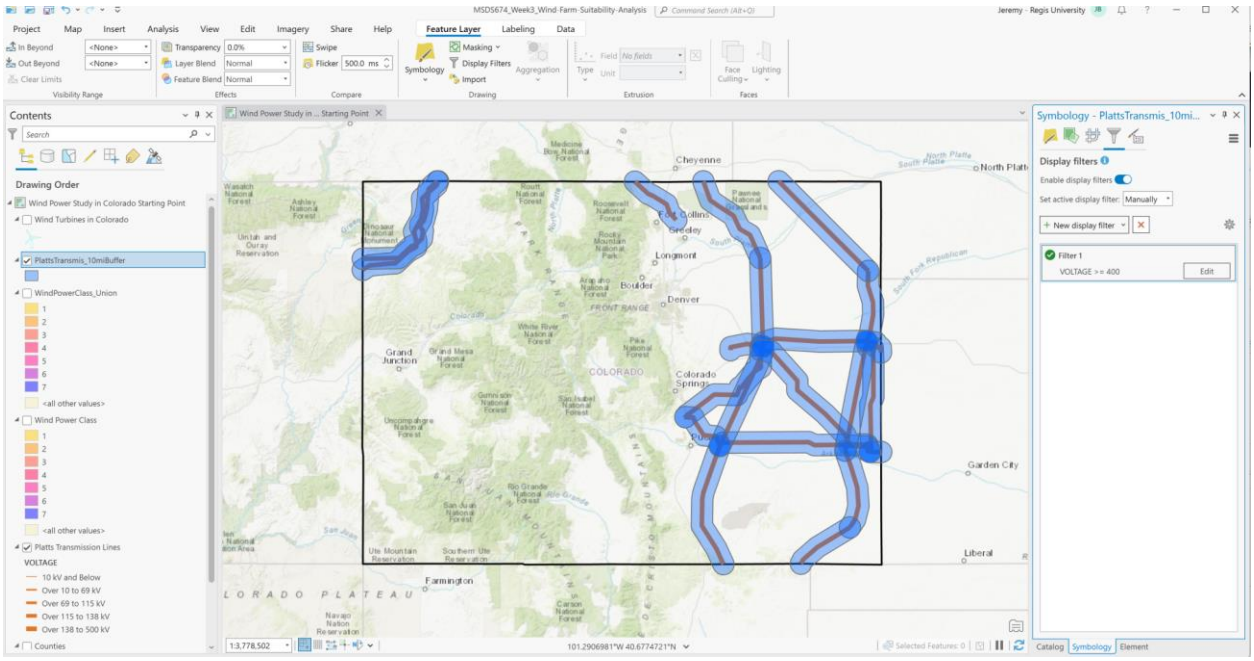

Figure 10: After applying 10 mi. buffer with voltage >= 400

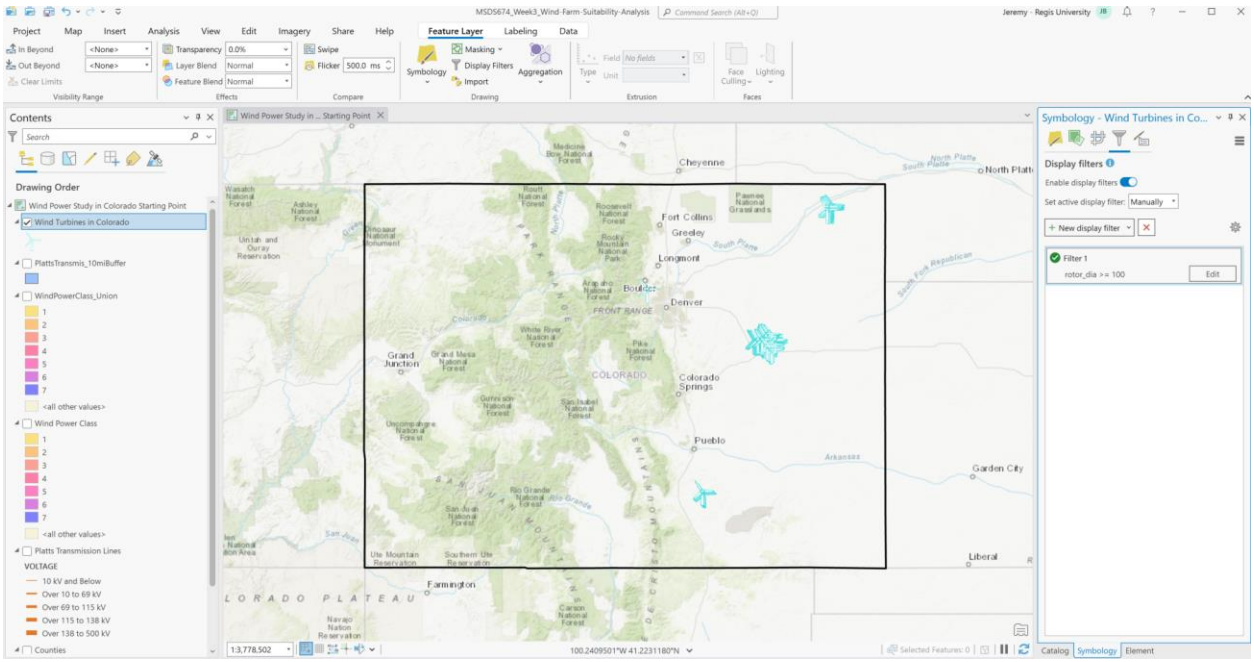

Figure 11: After filtering turbines only 100 meters and more

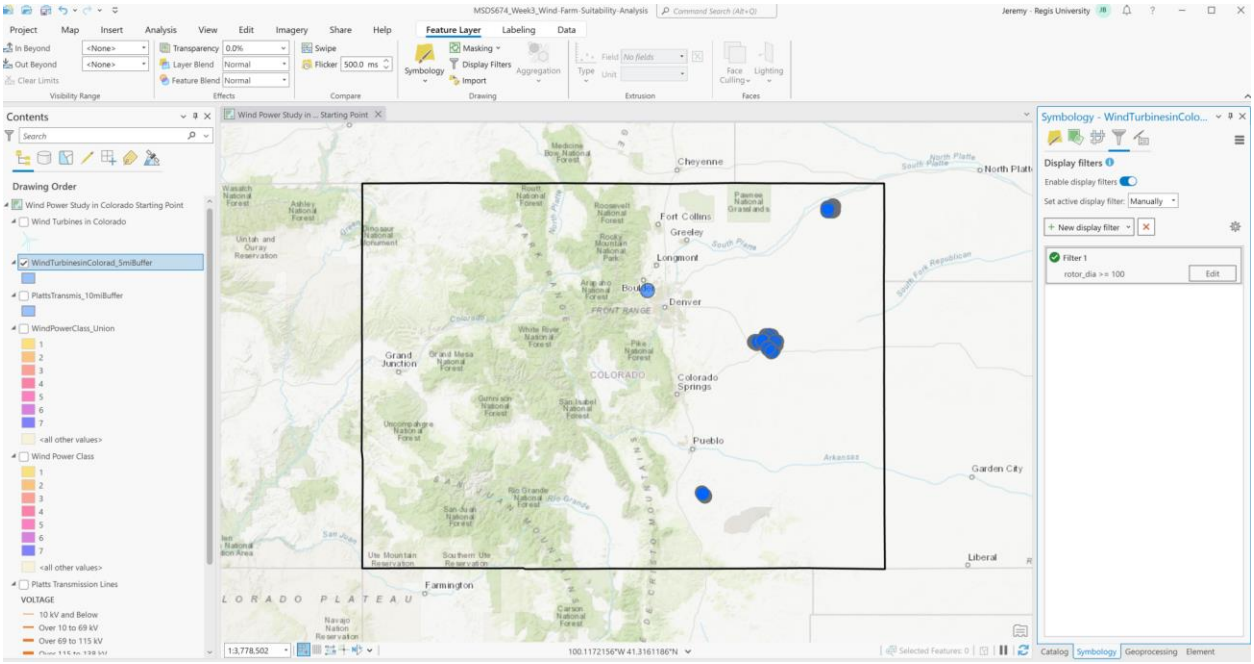

Figure 12: After applying a 5 mile buffer to the wind turbines with rotor diameter 100 meters or greater

At this point, I realized that running the local ArcGIS Pro version of the tutorial wasn't giving me proper results. I realized that I should try running the ArcGIS Classic Online implementation of the tutorial. After doing that and signing in, I began to have much better luck following the tutorial. Before this, I was having a lot of issues that I was emailing the professor about.

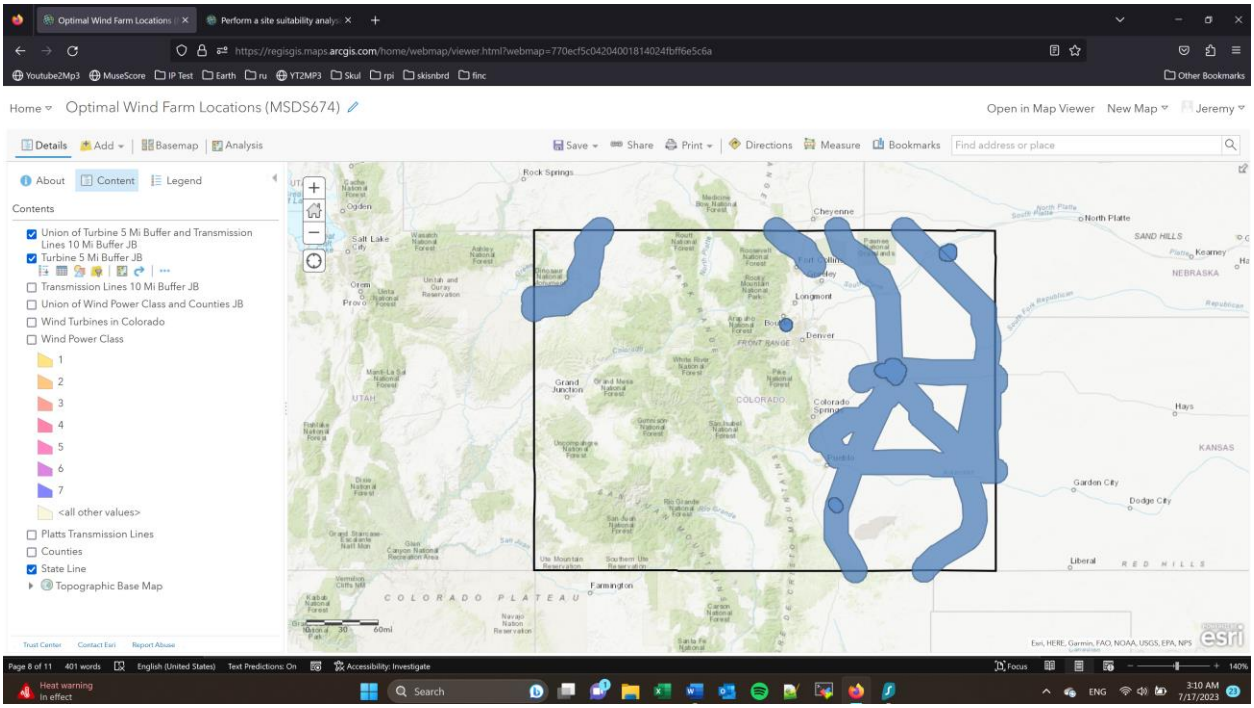

Figure 13: Union of the transmission line buffer and the windmill buffer

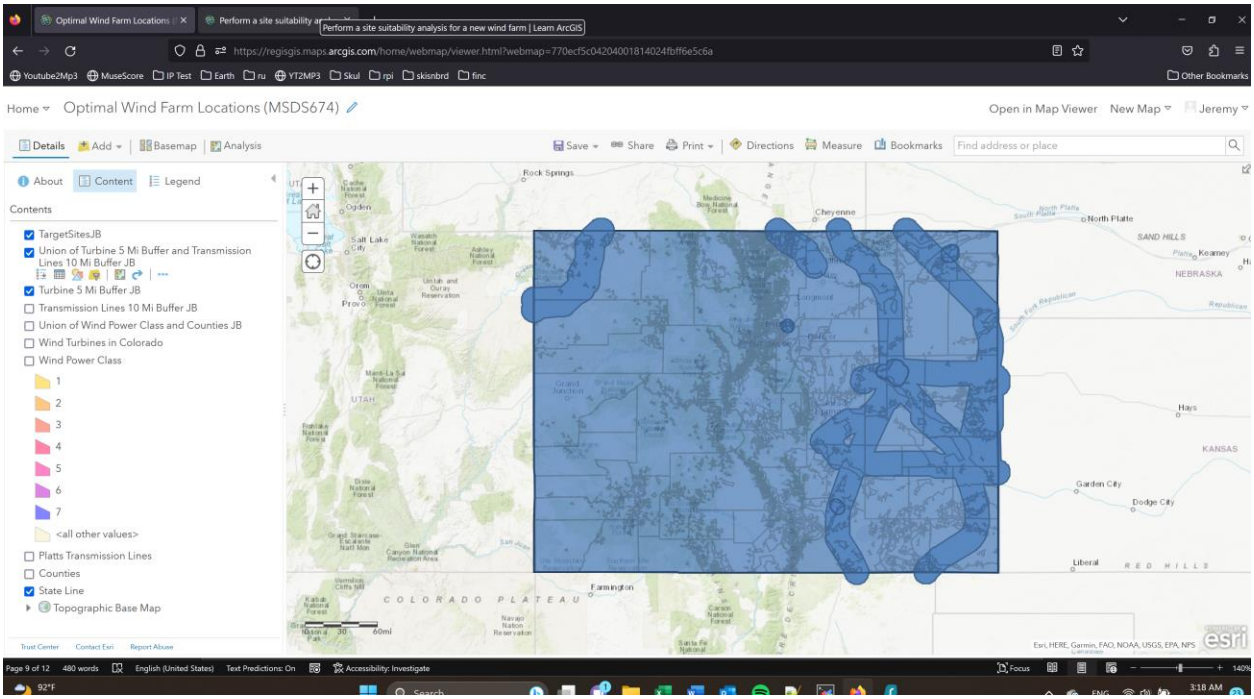

Figure 14: Creating the TargetSites feature after creating the Union and Buffer features

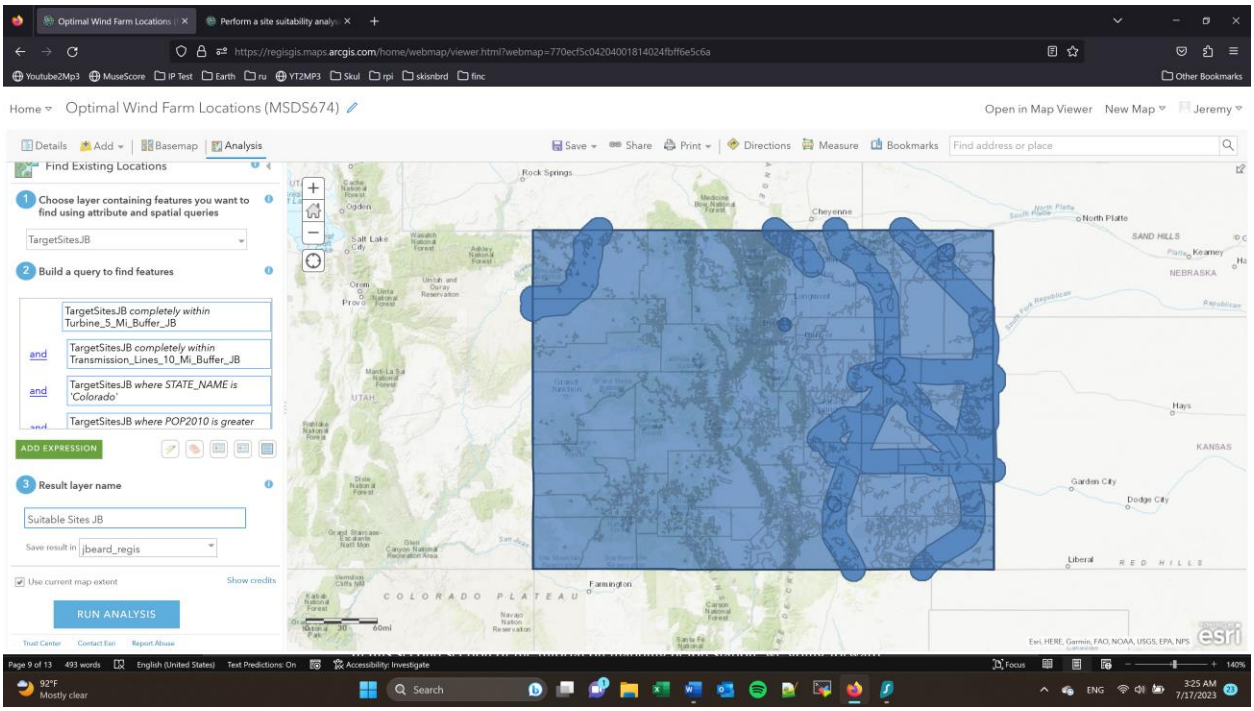

Figure 15: All queries needed to find the suitable sites

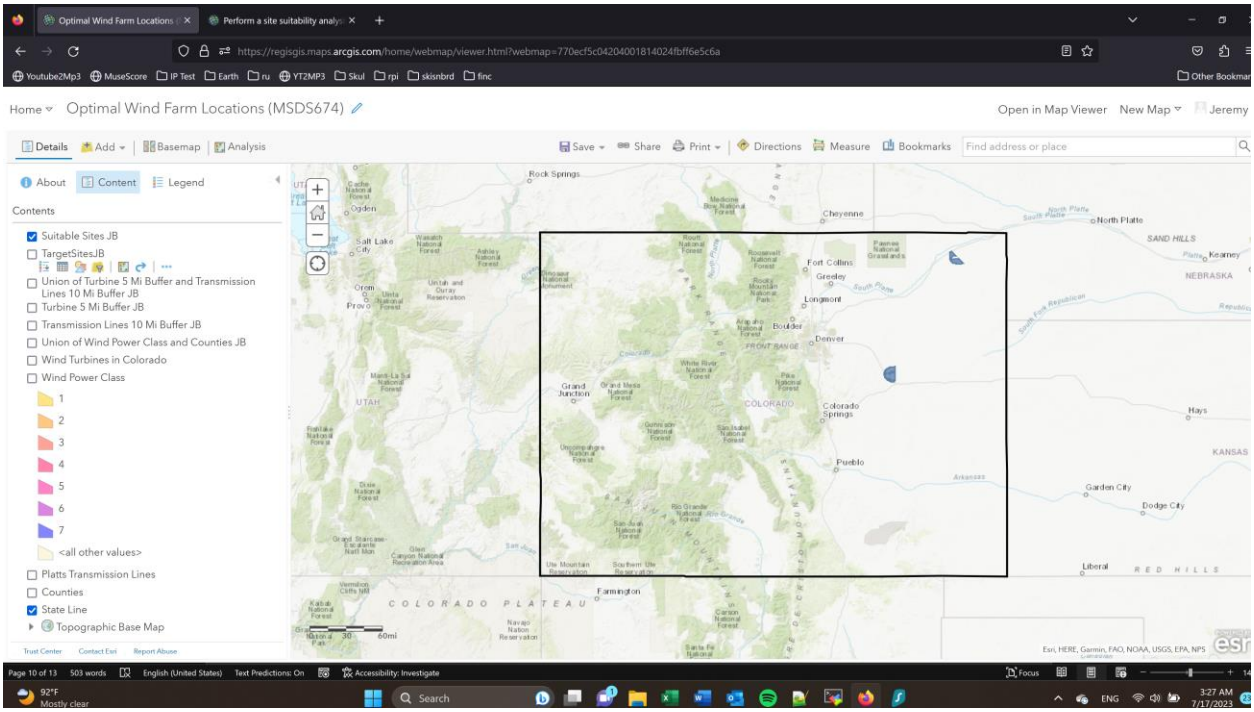

Figure 16: After applying the queries to find the suitable sites

Route to Prospective Sites

In this second section of the tutorial on mapping deforestation, we look into the potential drive time that a future site creates between different headquarter sites in Colorado. We perform an analysis on the drive time and assess whether the future sites fall within the requirements specified

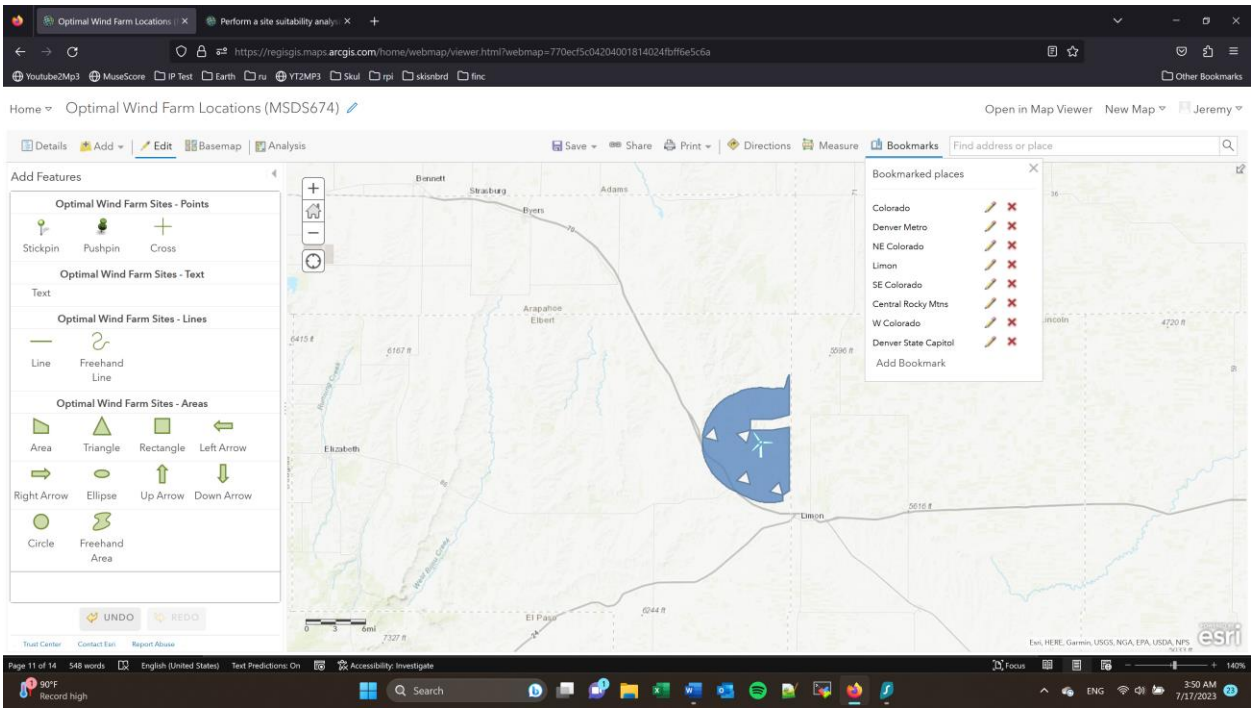

Figure 17: Creating a marker for Site 1 near Limon

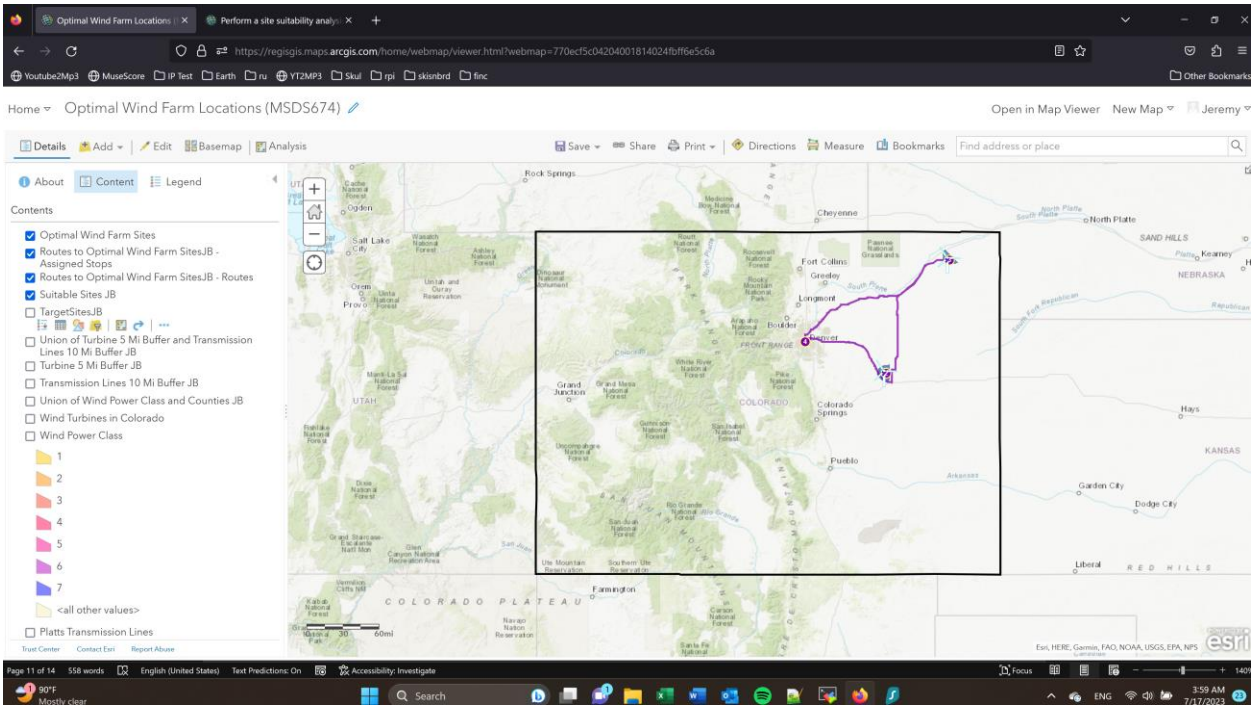

Figure 18: Showing the optimal routes to the optimal sites

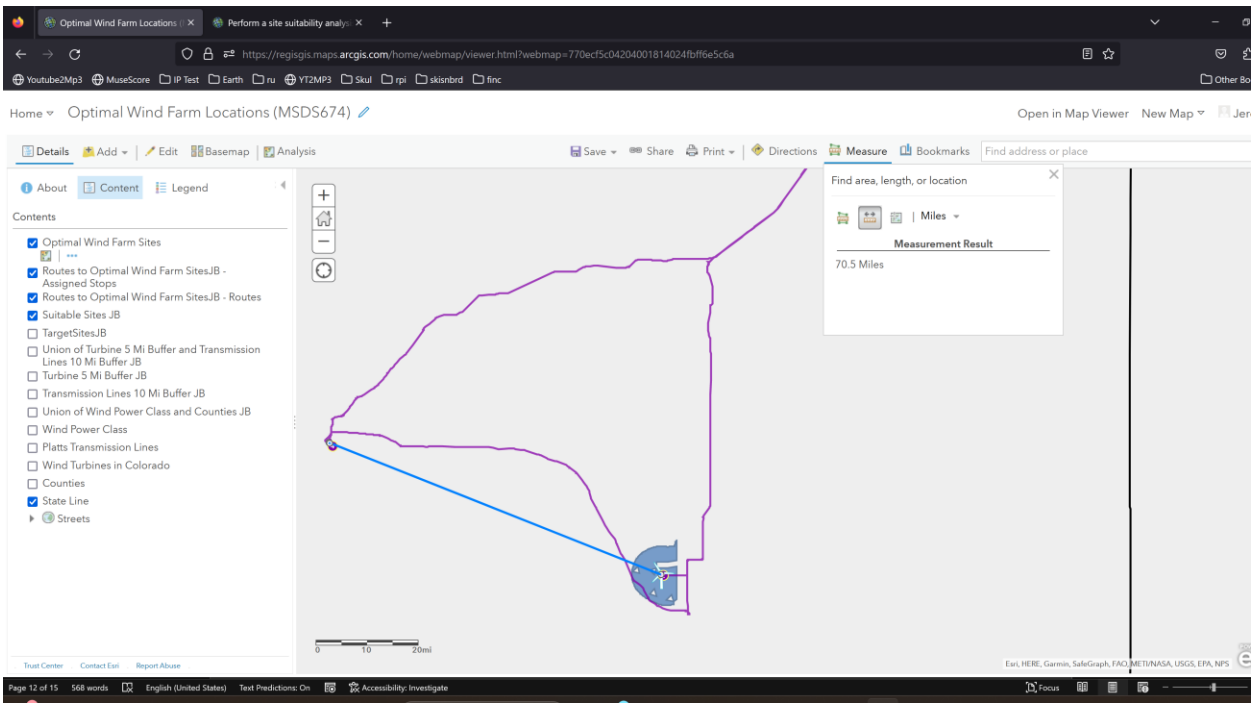

Figure 19: Showing distance from Limon site to Denver

It seems that the Limon site is about 70 miles from Denver whereas the Fleming site is about 130 miles away from Denver. This makes the Limon site much more attractive than the Fleming site.

Create a Web App

In this third section of the tutorial, we take what we have done in the web implementation of ArcGIS Pro, and we export it as a web application with some text details about the map. We share the link below in order to preserve what was created during this assignment. It appears that the Limon site is the closest potential site to Denver which makes it the most promising future wind turbine site, according to what this company requires.

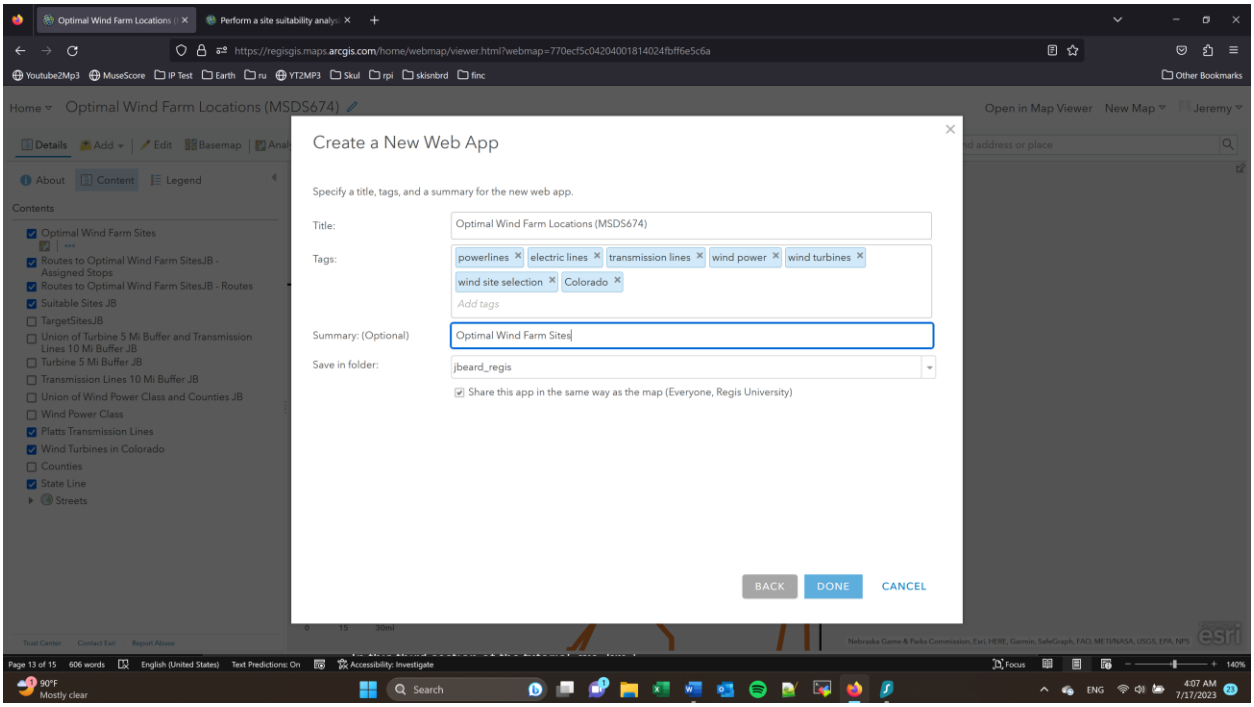

Figure 20: Creating a web app

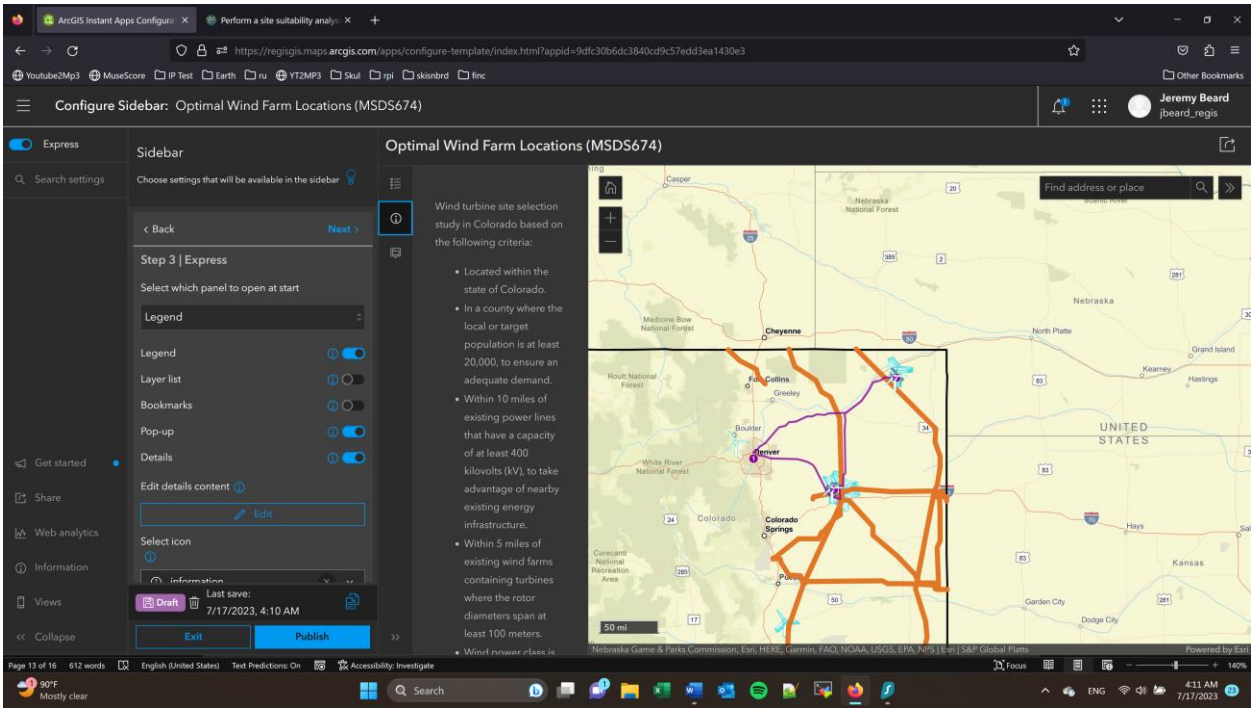

Figure 21: Web app with new details pane

Finally, we have our web app at https://regisgis.maps.arcgis.com/apps/instant/sidebar/index.html?appid=9dfc30b6dc3840cd9c57edd3ea1430e3 ! This was a fun exploration into what can be done with ArcGIS Pro.

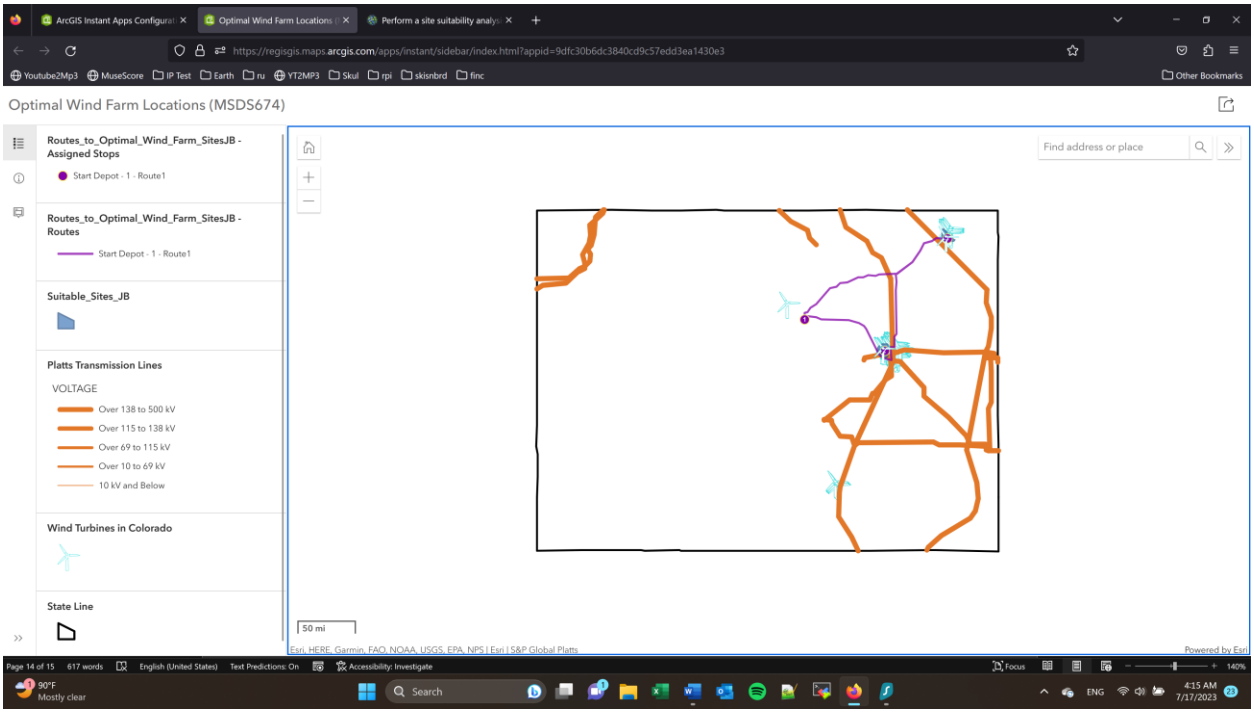

Figure 22: Final Web App

Conclusion

This tutorial in ArcGIS Pro taught us how to load in sample data, create various buffers and overlays such that the optimal wind turbine locations in Colorado were located based off of transmission line location, distance to Denver, and other parameters. Finally, this analysis was exported as a web app which could be shared with others and discussed in detail. Overall, after having an initial difficulty with learning where to actually create this tutorial (local vs. online), the tutorial was very straightforward and taught me more about the web view of ArcGIS Pro. Thank you!

References

Perform a site suitability analysis for a new wind farm. (n.d.). Learn ArcGIS. https://learn.arcgis.com/en/projects/perform-a-site-suitability-analysis-for-a-new-wind-farm/#conduct-a-site-suitability-analysis