This document lays out what you will need to create and submit for this milestone's peer review assignment. We present it to you early on so that you can think about these items as you go through the remaining material in this milestone.

What to do for this milestone

While the project itself is designed to be large and involve a significant amount of time and spatial analysis, for this milestone you don't need to start on any of that work yet. Instead, the purpose of this assignment is for you to determine what question you are setting out to answer, as well To start off your project, you need a testable, data-driven question. This question should be focused enough to allow for a specific answer. As mentioned in the project overview, if your project was about hazards and mitigation potential for a set of facilities, your research question might be something like the following:

What environmental hazards affect electrical infrastructure (generation station, transmission lines, substations) in the Los Angeles Metropolitan Area? What is the risk/exposure to hazards of each piece of infrastructure and what resources, tools, and technologies are available to reduce this exposure?

This question is still very large, but notice the specifics it provides: 1) It focuses the infrastructure of concern to specific types, namely generation stations, electrical transmission lines, and substations. 2) It focuses the question to a specific area. 3) It specifies what information we need to accomplish our task, specifically that we need to know the distribution of hazards affecting each one, and that we also need to know how to reduce the risk to each piece of infrastructure. Depending on your analysis, you may also wish to limit your work to data covering a specific time period or add other specifics to your questions that help narrow in on exactly what results you are looking for.

Another important purpose of your research question is that it should help define what data is necessary for a successful analysis. In this case, we would need data covering electrical infrastructure within Los Angeles, but we would also need data for “environmental hazards.” Environmental hazards is vague itself - you may wish to focus that in on specific hazards: earthquakes, winds, extreme rain, flooding, heat, etc, so that you can determine if the data you need to run your analysis exists and is available at all.

You may wish to form your research question as a **hypothesis** in order to state your expectations of the result. Outside of research settings, you may not always approach your project with this level of formality. Still, it's a good idea to practice this approach both for its applications to research, and for its usefulness in guiding your project design. By not only setting out the information you need, but also your expectation of the result and what factors you expect contribute to that result, you direct your analysis even more powerfully than the example above. Still, for this course, an analysis formed as a question instead of a hypothesis is perfectly acceptable.

What to include in your proposal

Your full proposal should be 600-1500 Words (approximately 1-2 type-written pages). Don't worry too much about the length, especially if writing in English isn't your strong point. Instead, focus on making sure that all the necessary information is in there. It's a good idea to start out with some background information on what you're researching - a paragraph or two - that help the reviewer of your proposal understand the question you're answering and why it's important to answer.

The most important component of your assignment, though, is the research question itself. Make sure to include it, and make it a prominent part of your proposal. The rest of your proposal will serve to support that the research question is answerable. As such, you should include somewhere in your proposal a listing of the required data to run your analysis and potential sources for that data. Be specific! List the names of the datasets and the URL of the site you can get the data from, or the agency that collects that dataset that you plan to get in touch with to obtain your data.

Another section of your proposal document should include your plan for how to answer the question with GIS. Outline your general workflow for taking your input data and getting the results that answer your question. Take the time to research approaches to similar problems that show potential spatial methods that can be used (where applicable), whether that's workflows outlined in help documents or scientific papers showing original ways of answering spatial questions. Summarize those methods and the sources in your proposal document.

Finally, include a section describing what you expect the results of your analysis to be. Don't just include a general description (for example: "the results will be 3 shapefile feature classes and a data table"). Instead, be specific and detail the answers you expect the data will provide. For the prior example on electrical infrastructure you might discuss which types of facilities you think will have the greatest risk from specific hazards. For example, "I expect that based on localized climate, the further inland substations will be at greater risk of failure due to heat." Remember that you don't have to be correct right now, you're making guesses based on what you already know about the data and based on what answers you want to actually get from your analysis. Whatever you do, don't purposefully direct your analysis so that the results match your expectations - follow the data and analysis honestly to get the true answer. In this example, you want to shape your analysis so that you get an accurate answer to the whether interior power substations have greater heat stress, but make sure you collect and analyze data that runs contrary to that theory if it exists and makes sense. It's OK to have been wrong - the most important thing is to get the real answers.

The Executive Summary

Once you've completed the main proposal, you will then need to create an Executive Summary of it, a shortened and condensed version that describes the goals and questions of your research question.

You'll need it for this course because after you complete this milestone, you will submit your Executive Summary with all of your future milestones so that your work on those milestones has the context of your broader project.

Try to keep your summary to no more than 300 words or so. That's not a hard limit, but it should be in that range because you want it to be quickly readable. In that space, make sure to include the original version of your research question along with some background material and any other information you find relevant to your analysis. You should also include a brief statement about what you expect the results of your analysis to be. You don't need to include your planned analysis approach or data sources in your summary.

Submission and grading

For this milestone, you will submit two items: your full proposal and your Executive Summary. You will primarily be graded on your inclusion of all of the components listed in this document and your thoroughness. Remember to include:

- Background information on your topic
- A specific and detailed research question
- Potential data sources
- Analysis methods or data processing plan, noting background research on methods, where applicable
- Expected results

Good luck! The rest of the items in this milestone are to help you refine your research question and your submission.