Lab 1: Scoping an Engineering Project

Background:

Several years ago, China recently severely limited the amount and types of recyclable goods it would accept. This has created a global "crisis" in the recycling market, especially plastics. As a result, many jurisdictions around the world have had to re-evaluate what it does for recycling, and how they should it approach the stewardship for the waste produced. It also raises larger questions on the role and value of recycling, and what it means for product design and how we approach our wastes. There are many online articles describing the current situation: this is just one of them.
https://e360.yale.edu/features/piling-up-how-chinas-ban-on-importing-waste-has-stalled-global-recycling

Canada has been particularly affected by this. See, for example:
https://www.theglobeandmail.com/canada/article-wish-cycling-canadas-recycling-industry-in-crisis-mode/

Any possibility of China accepting recyclables again has diminished as China is now set to ban practically all solid wastes (with some possible exceptions of nonferrous metals, etc.).
https://resource.co/article/china-ban-all-imports-solid-waste-2021

Scenario and Objectives

The City of Airdrie, Calgary, Canada, is a small city of approximately 70,000 people. Up until recently, it shipped its wastes and collected recyclables to the City of Calgary, located about 40 km or 30 minutes away to the south. Calgary is a much larger city with a population of 1.4 million. Airdrie's garbage would be disposed of in Calgary's landfill, and its recyclables would be included into Calgary's much larger recycling program. However, with the recent changes in the world recycling market, Calgary is questioning how many recyclables it can accept from Airdrie and other smaller municipalities. *Note: The description does not actually describe what is happening in Airdrie, but these types of scenarios can represent what many smaller municipalities are facing.

After investigating its options, the City of Airdrie has decided on **three possible alternatives for its recyclables**:

1. **Ship its collected recyclables to the City of Edmonton**, located approximately 2.5 hours or 250 km to the north. Edmonton has found a viable buyer that will still process recyclables. Waste from Airdrie would continue to go to Calgary for disposal.

For this assignment, you are part of an engineering consulting team that has been hired your objective is to evaluate which alternative (1, 2, or 3) for managing, handling, and processing recyclables can be considered as the preferred sustainable alternative. Assess the merits of the project on environmental and engineering analyses, not on sensationalism or unsubstantiated claims. Assume that NO final decisions have been made; instead, your team will make the final recommendation. **TRY TO BE "OBJECTIVE" IN YOUR ANALYSIS. DO NOT CONTACT ANY GOVERNMENT OFFICIALS or ENGINEERING/TECHNNICAL EXPERTS for input on this assignment.**

To undertake this assignment, **you will need to research what are the issues in such alternatives**. You can start with a Google search, but you should try to find **peer-reviewed, journal quality references**. In addition, you should search for other articles, such as industry related articles or write-ups about other similar, projects in other communities and what the outcomes have been, to provide you with more information to complete this lab. Finally, you may make other **reasonable assumptions as necessary to complete the lab; however, you should explain them.**

Part A:

You should assemble into groups of **3 students**. **Each student will assess one of the three presented situations**. **EACH student will independently focus on THREE MAJOR IMPACT CATEGORIES that may be of concern. However, you may wish to start off items [1] and [2] together to "brainstorm" ideas.**

1. **State clearly what your situation consists of.** This is particularly important so that the parameters of the proposed project or event are understood.

2. **Develop a list of what are the likely 'impacts' that will occur** according to the background assumptions above. At this stage, do not divide up these impacts according to significance, time considerations, etc. although you might be considering such aspects. At this stage, no impact is too ridiculous. For example:
   - Wildlife impacts. Local birds may fly into large glass windows of any engineered facilities.
   - Residential pet impacts. Local critters may get run over by construction vehicles.

   Provide a brief explanation (1 or 2 sentences) for each impact. Keep in mind that some of the 'impacts' you identify could actually be **benefits**.

3. Of the above impacts you listed, **do any impacts repeat or are related to one another? Arrange the impacts into THREE OVERALL IMPACT CATEGORIES.** The categories are not necessarily the impacts themselves: instead, several impacts may be grouped into a single category. Consider what is the **broadest category** that applies, and briefly explain the issue(s) in that category. Use whatever term for the category that you think is most suitable. For example:

(category)	(START with specific impact)	(explanation)
Health impacts:	Respiratory disease: Fumes from diesel exhaust during construction (specific impact)	Due to the close proximity of the residents (less than 500 m), we can reasonably expect that they would be ready receptors of any air pollution generated on-site during construction. As a result, health concerns are expected to be a moderately high issue for surrounding residents.

   Arrange your answer in the form of a table or chart as suggested; you have some flexibility in the appearance.

4. **Each person will use his or her three categories and associated impacts** and arrange them using a **network diagram**. Construct the diagram as extensively as possible to show the ***interrelationship between the different categories and subcategories – if applicable - as you move from left to right.*** The impacts might cross over into each other.
5. **Consider if there are any other activities that would arise from the project scenarios** that would present benefits or impacts that are not immediately obvious. You can also identify **mitigation options.**

EACH student will submit a maximum of 3 pages for his/her segment. Identify clearly YOUR segment.