- ➔ Construction and operation of the gas and oil plants (and settlements and other infrastructure) diffusing heat and carbon dioxide into the atmosphere.
- ➔ Removal of vegetation cover which insulates the permafrost. This also leads to less photosynthesis by plants and therefore lower uptake of atmospheric carbon dioxide. Because the tundra vegetation is so slow to grow, recovery from this damage could take decades. *HOWEVER, it could be argued that northerly parts of the Arctic are virtually barren anyway, so the impact would be minimal.*

- Permafrost melting releases carbon dioxide and methane (which is 25x stronger than C02) and on the North Slope, estimated CO2 losses from the permafrost vary from 7 to 40 million tonnes/year *(potential evaluation point…).*
- Gas flaring and oil spillages also release carbon dioxide.
- The thawing of soil increases decomposer microorganism activity therefore increasing rates of decomposition so more carbon is released into the atmosphere. *HOWEVER, it could be argued that the thawing of soil - as well as more precipitation and higher temperatures - allows more flora to grow anyway. Tundra can be a carbon sink AND a carbon source.*
- By 2200, ⅔ of the world's permafrost will have melted. This is bad because ¼ of all land in the northern hemisphere is permafrost and ⅓ of Canada's land mass is permafrost.
- In Fairbanks, Alaska melting permafrost has caused vast sinkholes, damage to infrastructure and could potentially release deadly diseases like anthrax from thawed caracasses - socioeconomic impacts.

Impacts on the water cycle

- Melting of permafrost and snow increase surface run-off and river discharge making flooding more likely. This means that in summer the wetlands and ponds become more extensive, increasing evapotranspiration and precipitation. This shows a change in the <u>stores</u> and <u>flows</u> of water - more water in the atmospheric store/hydrosphere and less found in the cryosphere.
  - ➔ The island of Svalbard houses the Global Seed Vault which ensures humanity's food supply in the event of a major global disaster. However, the vault got flooded in 2017.
  - ➔ HOWEVER… water extracted for industrial use and for the building of ice roads in winter reduces the localised run-off.
- Strip mining of aggregates (sand and gravel) for construction also creates artificial lakes which disrupt drainage and expose the permafrost to further melting. Natural drainage networks are also disrupted by road construction and the seismic explosions used to prospect for oil and gas. *HOWEVER, it*