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GIS for Water Resources

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Term Project Proposal

Title: Hydraulic Fracturing Water Sources for Natural Gas Recovery from the Barnett Shale

As our society continues to increase, so does our demand for energy. Not only are the economical and environmental effects of petroleum and coal felt throughout the world, our oil and coal reserves are quickly depleted. In an ideal world, we would transition straight to renewable and non-environmentally damaging sources of energy; however, our infrastructures are not built to handle our enormous demands. A promising transitional energy source may lie in natural gas.

There are abundant amounts of natural gas reserves around the world that could be tapped to help wean our society off of oil and coal. These reserves, however, are mostly in the form of shale beds. Shale has a relatively low permeability and thus it can be very difficult to extract the natural gas. New ideas and methods have been formed and implemented that aids in increasing the amount of extractable natural gas. One method is by hydraulic fracturing or “fracking” of the shale. This is done by injecting a highly pressurized fluid that perpetuates existing fractures in the shale which increases the permeability. An increased permeability means more gas can be more easily extracted from one area.

For my project, I plan on analyzing potential sources of water that could be used in hydraulic fracturing to recover natural gas from the Barnett Shale in northern Texas. The first step in my project will be to research deep groundwater aquifers underlying the area. I want to be sure that these aquifers are not used for potable water, and so I will also need to know the depths of the potable aquifers. I expect to either find this information on the USGS website, the Texas Natural Resources Information System (TNRIS) website, or by doing a literature review. Once I know the depths and thicknesses of the aquifers, I will plot them as layers in GIS. I will then use the Texas Water Development Board (TWDB) website to locate wells that reach deep enough depths and determine water levels and pumping rates. This information will help me calculate water volume and extraction potential. I will then plot areas of reasonable (exact rate will be determined later) resource potential in GIS.