

# Project Proposal: Rainwater Harvesting Sizing and Feasibility Study

By

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**Scope:** The scope of this project will be to develop a step-by-step method for sizing a rainwater harvesting system cistern for a household in a different regions of the United States.

**Summary:** The highest cost of any rainwater harvesting system is typically the cistern. This is also the most critical portion of any rainwater harvesting design, as an appropriately sized cistern will ensure that the system will handle the demand placed on it by the users. Virtually any area in the United States can harvest rainwater, however, in some areas the cistern required, due to limited rainfall, can be very large and thus make rainwater harvesting unfeasible. Through this study, individuals will be able to determine what size of cistern they would require for their needs and determine if harvesting rainwater is a viable option for their total water needs, non-potable needs, or not an option at all.

**Method:** This project will use ArcGIS Map and data from the USGS, primarily annual precipitation with both mean and median data, to determine approximately how much rainfall can be harvested in a location. Additionally, a method for determining catchment area along with calculations of loss will be determined. An equation for calculation of the cistern size will be developed in Excel that will allow users to simply input their water usage, collection area, and the precipitation data from ArcGIS to size the cistern. Cost estimates will be discussed in the report for understanding of the difference sizing makes, but a cost calculator will not be integrated into the system as these values change frequently based on location and materials. This will be facilitated through a final example for sizing of a system at the Blockhouse Ranch in Mason County, TX. The guide for these calculations will be the *Texas Water Development Board: The Texas Manual on Rainwater Harvesting*.