



## Semi-Arid Rangeland to New Houses: Behavior of a Non-Perennial Stream

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### Abstract.

Colorado's growing population has driven an increased demand for new housing. Increased housing development in Northern Colorado has in turn resulted in the urbanization of historically semi-arid rangelands. Urbanization is known to increase peak stream flows and the frequency of high flows. However, there is little documentation detailing how hydrologic responses in semi-arid rangelands are affected from pre- to post-development. Part of this lack of documentation can be attributed to semi-arid rangelands typically having non-perennial streams. While perennial streams have flow year-round, non-perennial streams are dry for parts of the year. As a result, non-perennial streams tend to have incomplete records of streamflow presence or absence and lack documentation of other characteristics such as stream morphology or response to precipitation events. Due to the lack of pre-development baseline observations, understanding the effects of development on non-perennial streams is especially difficult. In an effort to set a pre-development baseline and record hydrologic changes throughout the stages of housing development, this research will utilize drone imagery and time-lapse photography to monitor a non-perennial stream within the West Stroh Gulch rangeland located in Parker, Colorado. In 2020, a field camera was installed in West Stroh Gulch to take photos of the non-perennial stream channel every five minutes. Observations of streamflow presence or absence were manually recorded during photo processing. In December 2021, two additional field cameras were installed to increase the number of locations monitored for stream flow along the channel. Drone flyovers will be completed in the coming months to supplement these close-up observations with aerial views and topographic data for West Stroh Gulch. With this drone data, visual changes to the stream channel and the surrounding catchment will be captured through the stages of development. Combining aerial drone data and on-the-ground time-lapse photography will create a more complete picture of changes in the hydrologic responses of a semi-arid rangeland undergoing housing development.