

ASSESSING THE IMPACT OF REZONING AND URBANIZATION ON SURFACE WATERSHED HYDROLOGY

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ABSTRACT

Land development in urbanized watersheds poses a potential of increasing storm runoff rates and therefore increasing the risk of flooding in the downstream areas of a watershed. To investigate the temporal change in land use practices on the watershed hydrology, a hydrological analysis was conducted on Little Kitten Creek watershed located near Manhattan city of Riley county, Kansas, USA. Native land use types in the watershed changed in to commercial development and residential parcels due to rapid development over the period of ten years. Data collected and analyzed included digital elevation model (DEM) of study site, stream network and soil data using Arc GIS and Arc-Hydro Software. Watershed characteristics were also computed. The delineated watershed boundary, stream segments and soil data layers were over laid to produce soil maps. Time of concentration (T_c) was determined for the pre and post development conditions in the watershed using seven different methods. These computed time of concentration values were observed to be shorter for the post-development condition when compared to the pre-development condition of the watershed. The reduced time of concentration in the post development condition is attributed to increase in percentage of impervious areas due to increased residential development in the watershed resulted in increased runoff rates.

KEYWORDS: Rezoning, Time of Concentration, DEM, Arc Hydro, Kinematic Wave, Drainage Density, Circularity Ratio