Watershed models have been widely used to simulate the combined effects of topography, soil type, land use, and management on water quantity and quality across large scales (Aksoy and Kavvas, 2005; Borah and Bera, 2003) and aid decision making (Barnhart et al., 2018). Mechanistic or processed-based watershed models typically represent an environmental system as a series of equations that evolve a set of state variables. These models produce outputs that range temporally from minutes (e.g., Hydrologic Simulation Program in Fortran [HSPF; (Bicknell et al., 1996)], Stormwater Management Model [SWMM; (Rossman, 2010)]) to hours (e.g., Soil and Water Assessment Tool [SWAT; (Gassman et al., 2007)]) to days, years, and decades (e.g., Visualizing Ecosystem Land Management Assessments [VELMA; (Abdelnour et al., 2011)], Regional Hydro-Ecological Simulation System [RHESSys; (Tague and Band, 2004)]). Additionally, these models are generally classified as either semi-distributed, for example, models that utilize sub-basins (e.g., HSPF, SWAT), or spatially explicit, which simulate interrelated voxels within a gridded matrix (e.g., VELMA, RHESSYs). While each type of watershed model serves to aid decision making in different contexts, spatially explicit models are particularly advantageous because they enable explicit placement of infrastructure and management actions on the landscape and can simulate subsequent environmental impacts.