WATER IN THE VALLEY: FLOOD OF 2008

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In June 2008, overland flow of storm water and a rise in groundwater levels contributed to flooding 4,380 acres in Spring Green, Wisconsin. The affected area, which is located over a mile from the Wisconsin River floodplain, remained flooded for 5 months.

Groundwater elevations measured in Spring Green, in a shallow sand and gravel aquifer, show a rapid water table rise in response to spring snowmelt and precipitation events. This region experienced record snowfalls the previous winter, receiving twice as much precipitation as normal from December 2007 through February 2008. Over 5 feet of water table rise occurred following snowmelt in early spring. Intense rainstorms followed in late spring and early summer; 15.2 inches of precipitation fell in Spring Green during a 15-day period in May and June, corresponding to an additional 3.4 feet in water table rise.

Conceptual and numerical hydrogeologic models were useful to determine the role of groundwater to flooding in this region. Spring Green is located on a broad outwash terrace about 25 feet above the river, and is bordered to the north by a 200-foot-high sandstone and dolomite escarpment. Surface water from Big Hollow, a small valley lined with fine-grained sediment, drains onto the terrace. This geologic setting results in enhanced groundwater recharge to the shallow aquifer from runoff along the base of the bedrock escarpment and at the base of Big Hollow. Transient groundwater flow model simulations indicate a 12-foot rise in water table elevation may have occurred at some locations following spring snow melt and June rainfall. Water table rise above the land surface required drainage of the aquifer in order for flood waters to recede.

Groundwater-induced flooding explains the extensive and long-lasting nature of the flood, and its location far from the floodplain of the Wisconsin River. Modeling results indicate that a shift in climate in the mid-western U.S. towards increased frequency and magnitude of precipitation may cause water table rise sufficient to require adaptations in infrastructure and land use.

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