

Potentiometric Surface Map of the Bedrock Aquifers of Sullivan County, Indiana

by
Kristiana E. Cox
Division of Water, Resource Assessment Section
June 2017

Sullivan County is located in the west-central portion of Indiana, and is bounded by the counties of Vigo, Clay, Greene, and Knox to the north, northeast, east, and south, respectively. The state of Illinois borders the county to the west. Nearly the entire county lies within the Lower Wabash River Basin with small portions in the southeast and northeast corners within the White and West Fork White River Basin.

The potentiometric surface is a measure of the pressure on groundwater in a water bearing formation. Wells are completed in aquifers at various depths, and typically, under confined conditions (bounded by impermeable layers above and below the water bearing formation). However, some wells are completed under unconfined (not bounded by impermeable layers) settings. Water in a confined aquifer, which is under hydrostatic pressure, will rise in a well above the top of the water bearing formation. In contrast, groundwater in an unconfined aquifer, which is at atmospheric pressure, will not rise in a well above the top of the water bearing formation.

The potentiometric surface map (PSM) of the bedrock aquifers of Sullivan County was mapped by contouring the elevations of 305 static water-levels reported on well records received primarily over a 50 year period. Universal Transverse Mercator (UTM) coordinates for the water wells were either physically obtained in the field, determined through address geocoding, or reported on water well records. The location of the majority of the water well records used to make the PSM were field verified. Elevation data were obtained from a digital elevation model. Quality control/quality assurance procedures were utilized to refine or remove data where errors were readily apparent.

Static water-level measurements obtained from individual wells used to construct county PSM are indicative of the water-level at the time of well completion. The groundwater level within an aquifer constantly fluctuates in response to rainfall, evapotranspiration, groundwater movement and pumpage. Therefore, measured static water-levels in an area may differ due to local or seasonal variations. Because fluctuations in groundwater are typically small, static water-levels can be used to construct a generalized PSM. As a general rule, but certainly not always, groundwater flow approximates the overlying topography and intersects the land surface at major streams.

Potentiometric surface elevations range from a high of 600 feet mean sea level (msl) in the northeastern section of the county, to a low of 420 feet msl in the northwestern section of the county near the Wabash River. Regional groundwater flow direction is generally to the south and west towards the Wabash River, with localized flow towards the larger tributaries such as Turman Creek, Turtle Creek, and Busseron Creek.

Bedrock potentiometric surface elevation contours have not been extended through portions of the county. These areas are lacking in data and/or covered by more prolific unconsolidated deposits that limit the necessity to complete wells in bedrock.

The county PSM can be used to define the regional groundwater flow path and to identify significant areas of groundwater recharge and discharge. County PSM's represent overall regional characteristics and are not intended to be a substitute for site-specific studies.