

Potentiometric Surface Map of the Unconsolidated Aquifers of Morgan County, Indiana

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Morgan County, Indiana is located in the central part of the state and is bounded by the counties of Hendricks, Marion, Johnson, Brown, Monroe, Owen, and Putnam to the north, northeast, east, southeast, south, southwest and northwest, respectively. The county lies within the White and West Fork White River Basin.

The potentiometric surface is a measure of the pressure on water in an aquifer, or water bearing formation. Groundwater under confined conditions (bounded by impermeable layers above and below the water bearing formation) is under hydraulic pressure and will rise in a well above the top of the aquifer. The groundwater level in an unconfined aquifer (not bounded by impermeable layers) is at atmospheric pressure and will not rise in a well above the top of the aquifer formation. The potentiometric surface in most wells completed in the unconsolidated aquifers within the county rises above the top of the aquifer due to the confining nature of the system. However, some wells were completed in unconfined settings in an aquifer not bounded by impermeable layers.

Static water-level measurements obtained from individual wells used to construct a county Potentiometric Surface Map (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 because of 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.

The potentiometric surface map of the unconsolidated aquifers of Morgan County was mapped by contouring the elevations of over 760 static water levels reported on well records received primarily over a 50-year period. Universal Transverse Mercator (UTM) coordinates for the water wells were 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.

The potentiometric surface contours are mapped primarily for the upper 100 feet of the unconsolidated materials and utilize data for wells 100 feet or less in depth. When shallow data are sparse or unavailable in an area, deeper wells are used to complement the mapping. About 80 percent of the wells mapped are 100 feet or less in depth.

Unconsolidated aquifer potentiometric surface elevations range from a high of 881 feet mean sea elevation (msl) in north-central Morgan County, to a low of 556 feet msl in the southwest portion of the county. Groundwater flow direction within the majority of the county is generally southwest towards White River or its major local tributaries. However, in the northwestern portion of the county, groundwater flow direction is generally westward off of a topographic high toward Mill Creek. Portions of the county were not mapped due to a general lack of water well data and/or limited water bearing deposits. These areas are generally considered to have limited aquifer resources leaving it difficult to represent accurate PSM elevations (see Aquifer Systems Map 70-A; Unconsolidated Aquifer Systems of Morgan County, Indiana; Maier 2010).

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.