

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

by

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Delaware County, Indiana is located in the east-central portion of the state bounded by Madison, Grant, Blackford, Jay, Randolph, and Henry Counties to the west, northwest, north, northeast, east, and south, respectively. Northern portions of the county are situated within the Upper Wabash River Basin, while the remainder of the county is within the White and West Fork White River Basin.

The Potentiometric Surface Map (PSM) of the unconsolidated aquifers of Delaware County is mapped by contouring the elevations of 1499 static water levels reported on well records received primarily over a 50-year period. These wells are completed in unconsolidated 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 in unconfined settings with water bearing formations not bounded by impermeable layers. The potentiometric surface is a measure of the pressure on water in a water bearing formation, or aquifer. Water in an unconfined aquifer is at atmospheric pressure and will not rise in a well above the top of the water bearing formation. In contrast, water in a confined aquifer, which is under hydrostatic pressure, will rise in a well above the top of the water bearing formation. The potentiometric contour lines crossing through Prairie Creek Reservoir represent the potentiometric surface of the groundwater in the immediate area, not the water level of the reservoir, which is a man-made feature.

Static water level measurements in individual wells used to construct county potentiometric surface contours 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, current site-specific conditions may differ due to local or seasonal variations in measured static water levels. Because fluctuations in groundwater are typically small, static water levels can be used to construct a generalized PSM. Groundwater flow is naturally from areas of recharge toward areas of discharge. As a general rule, but certainly not always, groundwater flow approximates the overlying topography and intersects the land surface at major streams. The contours were determined based on the amount of data and the degree of change in water levels between wells.

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 is sparse or unavailable in an area, deeper wells are used to complement the mapping. Portions of Delaware County do not have unconsolidated potentiometric surface elevations because these areas are either lacking in data and/or covered by thin or unproductive unconsolidated deposits.

Data collected to generate the PSM were standardized and validated for accuracy. Universal Transverse Mercator (UTM) coordinates for the water wells were either physically obtained in the field, determined through address geocoding, or determined based 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 derived from a digital elevation model based on LiDAR. Quality control/quality assurance procedures were utilized to refine or remove data where errors were readily apparent.

Potentiometric surface contours are developed based on the static water levels from the unconsolidated aquifer systems and displayed here with 10-foot contours and 50-foot index contours. Potentiometric surface contours in Delaware County range from a high of 1090 feet mean sea level (msl) in the southeast, to a low of 840 feet msl in the north where the Mississinewa River flows from the county. Groundwater flow direction is generally towards major drainage within the county. In the northeast, north of the major basin boundary groundwater flow is northwest toward the Mississinewa River. In the remainder of the county groundwater flow is generally transitioning from northwest to west and southwest toward the White River and its tributaries.

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.