

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

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Noble County, Indiana is located in the northeastern portion of the state and is situated within three major drainage basins. The east-central and southeast portions of the county are located within the Maumee River Basin, the southwest and south-central portions of the county are located within the Upper Wabash River Basin, and the remaining portions of the county are located within the St. Joseph River Basin.

Coordinate locations of water well records were physically obtained in the field, determined through address geocoding, or reported on water well records. Elevation data were either obtained from topographic maps or a digital elevation model (DEM). Elevation and location quality control/quality assurance procedures were utilized to refine or remove data where errors were readily apparent.

The Potentiometric Surface Map (PSM) of the Unconsolidated Aquifers of Noble County was mapped by contouring the elevations of approximately 2900 single measurement static water-levels reported on water well records. The potentiometric surface is a measure of the pressure on water in a water bearing formation. These wells are completed in aquifers at various depths, and typically, under confined conditions (bounded by impermeable layers above and below the water bearing formation), although a few wells are completed under unconfined (water table) settings. Water in an unconfined aquifer (not bounded by an impermeable layer above) is at atmospheric pressure and will not rise in a well above the top of the water bearing formation, in contrast to water in a confined aquifer which is under hydrostatic pressure and will rise in a well above the top of the water bearing formation.

Static water-level measurements in individual wells used to construct potentiometric surface maps 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 groundwater pumpage. Therefore, current site specific conditions may differ due to local or seasonal variations in measured static water-levels. Because fluctuations in groundwater are generally small, static water-levels can be used to approximate regional groundwater flow direction. 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 objective in creating county PSM's is to map static water-levels in the upper 100 feet of unconsolidated materials. If an area of the county has few located wells in the zero to 100 feet interval, then the static water-levels in wells completed between 100 to 200 feet, if available, are used to complement the mapping.

Within the Maumee River Basin in Noble County the potentiometric surface elevations range from a high of 1004 feet mean sea level in the east-central part of the county, to a low 824 feet in the southeast part of the county. Generalized groundwater flow direction within the Maumee River Basin, therefore, appears to be toward the southeast. Within the Upper Wabash River Basin the potentiometric surface elevations range from a high of 911 feet along the basin boundary, to a low of 846 feet in the southern part of the county. Generalized groundwater flow direction within the Upper Wabash River Basin, therefore, appears to be from the north to the south. Within the St. Joseph River Basin the potentiometric surface elevations range from a high of 983 feet in the northeast part of the county, to a low of 856 feet in the northwest part of the county. Generalized groundwater flow direction within the St. Joseph River Basin, therefore, appears to be from the east to the west.

Saturated thickness of the water bearing formations in Noble County average about 20 feet thick, and are composed predominantly of sand and gravel. Approximately 80 percent of the wells in Noble County are estimated to be under confined or semi-confined conditions. A Bedrock PSM was not constructed for Noble County due to the relatively small number of wells utilizing the bedrock.

The county PSM can be used to define the regional groundwater flow path and to identify significant areas of groundwater recharge and discharge. However, due to the complex glacial geology, especially around lakes the local groundwater flow may differ from the regional groundwater flow that is indicated by the PSM.