Extracted from:

The Groundwater Atlas of Saunders County, Nebraska
Resource Atlas No. 9
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The large plain in the eastern part of the county is about 30 miles long and 7 miles wide and is called the Todd Valley. The Todd Valley represents an abandoned channel of the Platte River that has relatively thick accumulations of sand and gravel. The Todd Valley was named by Dr. G.E. Condra in honor of Professor J.E. Todd, who performed early research on these deposits. The Todd Valley was probably formed just prior to the deposition of the Peoria Loess (Reed and Dreezen, 1965), which occurred between 27,000 and 17,000 years ago (Muhs et al., 2013). The Todd Valley is at a higher elevation than the Platte Valley and is covered by Peoria Loess and modern soils, but is nonetheless evident as a valley in the landscape. Thickness of the Peoria Loess in the Todd Valley ranges from approximately 40 feet at the northern end of the valley to nearly zero at the southern end of the valley (Mason, 2001; Woodward-Clyde, 1996).

(from Abstract): In Saunders County, the primary aquifers are relatively young unconsolidated sediments of the Quaternary System (2.58 million years old or younger). These deposits are most widespread in the Platte River valley and Todd Valley alluvial aquifers. Well fields for several municipalities, including Lincoln and Omaha, are located in the Platte River valley in Saunders County. The Todd Valley is a former channel of the Platte River that was probably abandoned at least 27,000 years ago and is filled with fluvial sediments overlain by Peoria Loess and modern soil. The saturated thickness of Quaternary material in these alluvial aquifers ranges from approximately 40 to 120 feet.

Although the alluvial aquifers are widespread in the eastern Saunders County, the thickest saturated Quaternary materials occur in the western part of the county in paleovalleys eroded into bedrock. The two deepest paleovalley aquifers in Saunders County are collectively referred to here as the Dwight-Valparaiso Ground Water Reservoir, with saturated thicknesses ranging from approximately 100 to 230 feet.

In addition to the primary Quaternary aquifers, the Dakota aquifer (formally the Maha aquifer) serves as a secondary aquifer in places. The Dakota Group (~100 million years old) is the uppermost bedrock unit beneath most of the county. The lithology of the Dakota Group includes both aquifer and aquitard material in highly variable proportions. Given this variability, transmissivity is perhaps a more useful parameter than saturated thickness to describe potential aquifer yield. Estimates of transmissivity for the Dakota suggest minimum values of at least 5,000 to 10,000 gallons per day per foot (gpd/ft) across most of Saunders County.

Groundwater in both the Quaternary and Dakota aquifers generally flows from west to east. The flow directions in the Quaternary aquifers are more variable than in the Dakota due to the effects of surface and bedrock topography and hydrologic connections to surface water. Groundwater under the Platte River valley generally follows the river valley, while groundwater in the Todd Valley appears to flow fairly consistently to the southeast at an estimated velocity of about 2.5 feet per day. Two localized groundwater divides occur in the Quaternary aquifers, one located in

the Todd Valley near Morse Bluff, which probably causes some north-south flow, and the other in the Dwight-Valparaiso Ground Water Reservoir near Valparaiso, which causes localized east-west flow.

Quaternary aquifers in Saunders County probably receive about 2.3 inches of recharge annually. The locations and mechanisms of this recharge are not well understood and are the subject of continuing investigation by scientists and government agencies. Water quality in the Quaternary aquifers is generally good, with nitrate being the most widespread contaminant. The water quality in the Dakota aquifer is also generally good, although it may have naturally high concentrations of salt or other dissolved ions. The distribution of salty or mineralized water in the Dakota aquifer is not well known, although chloride concentrations appear to be highest in the vicinity of Ceresco and Ithaca. Saline water in the Dakota aquifer is probably sourced from salts that dissolve out of the underlying Pennsylvanian rocks and move into the Dakota aquifer by either natural or pumping-induced upward gradients.