3.0 Conceptual Flow Model

When a well extracts water from an aquifer, it pulls in groundwater from all directions – not just north, south, east, and west, but also from above and below the well. This means that the depth, in addition to the lateral direction, must be considered when evaluating groundwater movement toward a pumping well. The region of the subsurface from which groundwater is pulled into the well is called the capture zone, and is of special interest to the protection of the water source. Even though groundwater is pulled into a well from all three dimensions, the capture zone is usually represented two-dimensionally as an area on the land surface.

A conceptual model was created to describe the components of the aquifer system surrounding the Indian Lake Borough Waterworks wells (**Figure 3**). The conceptual model distills the essential hydrogeologic information into a simplified set of assumptions. Based on a review of published geologic and hydrologic data for the area, the following assumptions were used:

- The water budget for study area is defined as a closed system, where inflow equals outflow.
- The groundwater basin supplying water to the wells encompasses the Stoneycreek River watershed subbasins, creating an overall regional groundwater flow from the headwaters towards the stream valleys.
- The majority of recharge to the aquifer system occurs in the up-dip outcrop areas on the flanks of the Berlin Syncline. Secondary recharge occurs through vertical leakage.
- Groundwater flow, on the order of one foot per day, is generally perpendicular to bedrock strike in a down-dip direction.
- The Stoneycreek River, to the west of the wells, is a regional discharge point of the groundwater system. The average elevation of the river coincides with the elevation of the groundwater table.
- The wells produce water from a highly layered confined aquifer system comprised of cyclic sequences no larger than tens of feet thick creating a hydraulic condition where horizontal conductivity is much greater than the vertical conductivity with limited degree of hydraulic interconnection between layers.
- Each stratigraphic interval exhibits a discrete hydraulic head.
- The bedrock fractures are bedding-parallel with vertical fractures common in valley floor. The bedrock fracture density is greater in the valley floors than in the upland areas.