

perennial or ephemeral based on the stream order. Perennial streams are comprised of stream reaches with a stream order greater than or equal to three.<sup>1</sup> Stream reaches with a stream order less than three are deemed to be ephemeral (**Figure 4**).

### **5.3 Field Data**

To calibrate the hydrogeologic model, stream flow and well water level data were incorporated into the model. The process involved varying estimated parameters (such as hydraulic conductivity) to match model outputs (like groundwater table elevation) with observed data.

The water level data used in the model calibration were derived from the water well inventory (WWI) and the ground-water site inventory (GWSI) of the Pennsylvania Ground Water Information System (PAGWIS; DCNR, 2014), and the Pennsylvania Drinking Water Information System (PADWIS; DEP, 2013) (**Figure 6**). The data in PAGWIS come from several governmental agencies and private well drillers who submit data to the Pennsylvania Geological Survey. The USGS maintains the National Water Inventory System (NWIS) which contains comprehensive information for wells and streams located across the country (NWIS; USGS, 2014c). The GWSI database, a subset of the NWIS inventory, is an inventory of USGS monitoring wells. The Pennsylvania Department of Environmental Protection maintains an inventory of permitted drinking water sources (PADWIS) within the Commonwealth in accordance with Pennsylvania's Safe Drinking Water Act. Water level data from 42 wells were used in the modeling effort.

The groundwater table (and hence the water level within the wells) fluctuates both daily and seasonally. The hydrogeologic model is a steady-state model that ignores short-term variations in favor of an average long-term condition. To calibrate the model based on the observed water level data, a single groundwater table elevation (or head) value is assigned to each observation well, along with a range of elevation values within which the water level would be expected to fall or rise. Ground surface elevation data at each well was obtained from the DEM.

### **5.4 Groundwater Recharge**

Groundwater recharge is the rate at which precipitation infiltrates to the bedrock to supply water to the groundwater system. It is a function of average precipitation, land use, morphology and the underlying geologic formation. Groundwater recharge rates are estimated for a particular area by measuring the base flow of the area streams because, in theory, the discharge rate of groundwater to

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<sup>1</sup> Based on the Strahler Stream Order hydrology algorithm.