The Pennsylvania Department of Environmental Protection (DEP), Bureau of Water Supply Management, conducted an assessment of the potential contamination sources to the groundwater sources that are part of the Newtown Artesian Water Company’s public drinking water system. The objectives of this assessment were 1) to identify all potential pollutants within the area that contributes water to each drinking water source and 2) to prioritize the potential pollutants’ influence upon each drinking water source. This assessment evaluated contaminants that may enter the source water supplying Newtown Artesian’s drinking water sources. With this information Newtown Artesian Water Company may develop an effective source water protection program.

The Newtown Artesian Water Company serves a population of approximately 30,000 customers in Newtown Borough, Newtown Township, and Middletown Township, Bucks County. There are five groundwater sources for Newtown Artesian. The wells are located in three municipalities: two wells in Newtown Borough, two in Middletown Township, and one in Newtown Township. Newtown Artesian also has interconnections with Northampton Bucks County Municipal Authority, Pennsylvania American Water Company-Yardley, and the Bucks County Water and Sewer Authority-Southwest, some of which provide water that has the Delaware River as a source. This assessment pertains to Newtown Artesian’s groundwater sources Well Nos. 4, 5, 6, 14 and 18.

To begin the assessment of all potential pollutants for each drinking water source, a study area was defined. DEP uses a three-tiered wellhead protection area approach for wells, springs, and infiltration galleries. Zone I is the innermost protective zone around the wellhead and ranges from a 100- to a 400-feet radius. Zone II, the capture zone, is the surface area overlying the portion of the groundwater aquifer through which groundwater is diverted to the drinking water well during pumping. Approximate Zone II areas for each well were delineated using groundwater modeling. Zone III is the land area beyond Zone II that contributed recharge to the aquifer within the first two areas via surface water or groundwater.

The land uses that typically contribute to groundwater contamination were mapped within Newtown Artesian Water Company’s assessment areas. The water system controls some land within the Zone I protection areas around all five wells. The Zone II areas are primarily residential and commercial. Some forested and open land is still in this area, though the area is primarily developed. The Zone III area was not delineated for Newtown Artesian’s wells because they do not meet any of the criteria and are not under the direct influence of surface water.

The potential pollutants associated with each land use were then identified. Commercial facilities generate various waste products. For example, “automobile repair shops” and “gasoline stations” typically use, store, or handle petroleum hydrocarbons (gasoline and diesel fuel), volatile organic chemicals (solvents), heavy metals, and other metals. Industrial facilities can generate hazardous wastes. Residential areas can discharge pollutants related to household hazardous waste and lawn care chemicals. Transportation corridors create potential for spill of petroleum and hazardous materials in
addition to road salt applications. Staff from DEP attempted to identify all the potential contamination sources and their related pollutants.

Each potential pollutant was then evaluated using a Susceptibility Analysis Matrix, to identify a Susceptibility Rating for each particular contaminant. A letter value of A (High) through F (Low) was then assigned to each contaminant. The factors that determine the assigned value are time of travel, persistence, quantity, sensitivity of the water source, and likelihood that the pollutant could be released.

The sensitivity values of Newtown Artesian’s wells were rated as “High”. Well Nos. 4 and 5 have had samples detect nitrate levels of over 50% of the maximum contaminant level (MCL). The well and aquifer properties of Well No. 6 classified it as a highly sensitive well. Well Nos. 14 and 18 have had samples detect volatile organic compounds (VOCs).

Newtown Artesian’s wells were determined to be most susceptible to contamination from transportation corridors and railroad transportation (“A” ratings). Potential pollutants used in residential areas also pose a high threat to these wells as well as a bus/truck terminal and auto repair shops (“B” ratings). The majority of potential contaminants in this protection area received “C” and “D” protection ratings. Although these potential sources of contamination have lower protection priorities, the cumulative effect of the sources on the system’s wells should be taken into consideration.

Accounting for these potential contaminant sources and considering their respective protection priority ratings will assist Newtown Artesian Water Company in developing a specific and useful source water protection program.