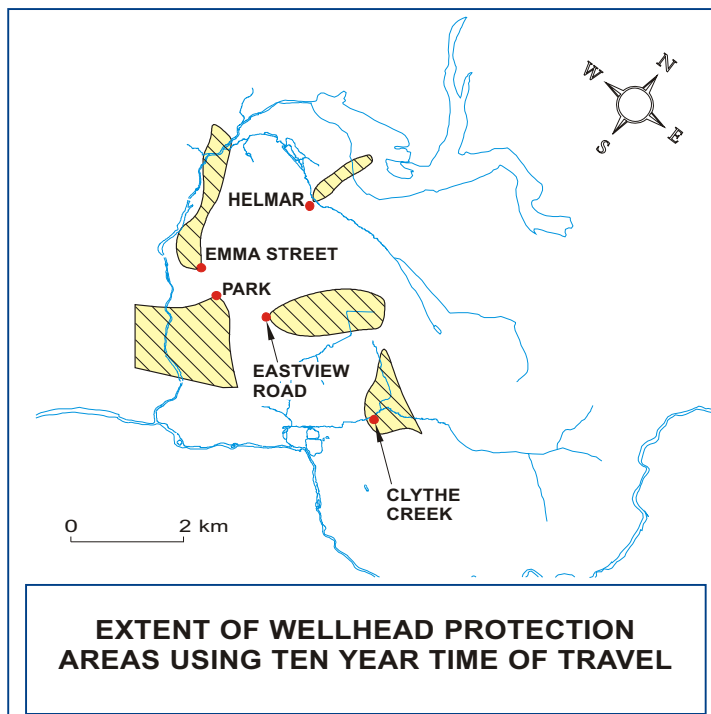


PROBLEM

The City of Guelph (1994 population 89,257), located in south central Ontario, relies on groundwater as its source of water supply. The supply system consists of a shallow perforated system at the base of bluffs along the Eramosa River (referred to as the Arkell Spring Collector System) and a network of 24 municipally owned wells completed in the carbonate rich bedrock that underlies the City. Given the importance of this resource, the City initiated a comprehensive study to evaluate the existing water supply system and its ability to meet existing and future water supply demands, as well as the development of a wellhead protection plan.



APPROACH

The City of Guelph has been divided into a number of quadrants to facilitate the investigation. One quadrant is being investigated each year as City resources permit. Each quadrant study involves a multiphased approach to assess the existing condition of the aquifer. The investigation of the northeast quadrant was completed in 1994.

The initial phase of the study involved the collection, review and compilation of available data on the water supply system, individual wells, historical water takings and groundwater quality. Information sources include the City of Guelph and the Ontario Ministry of Environment and Energy.

Pumping tests, including variable (step) rate and long term constant rate tests, were completed on various municipal wells to evaluate aquifer performance. Aquifer response to pumping is recorded manually and through the use of data loggers within observation wells.

A computer model was developed to simulate the flow regime and to predict the maximum extent of capture zones that would develop during pumping.

SOLUTION

A wellhead protection strategy has been proposed for the northeast quadrant of the City. This strategy is based on the recharge potential through the overlying semi-confining unit. In areas where this unit is thin there is a greater potential for contaminants to move rapidly through the overburden and the bedrock towards the wells with little or no dispersion and dilution. As a result land use restrictions were recommended for areas with exposed bedrock, overburden less than 5 m thick or granular materials immediately overlying the bedrock.