

## PROBLEM

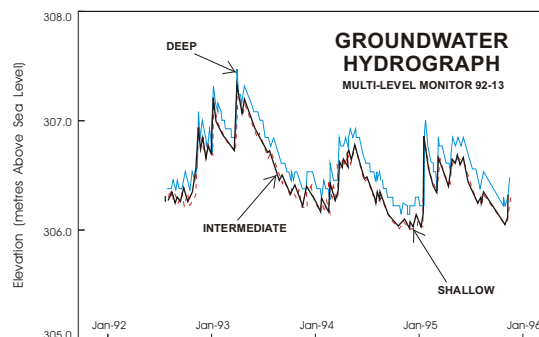
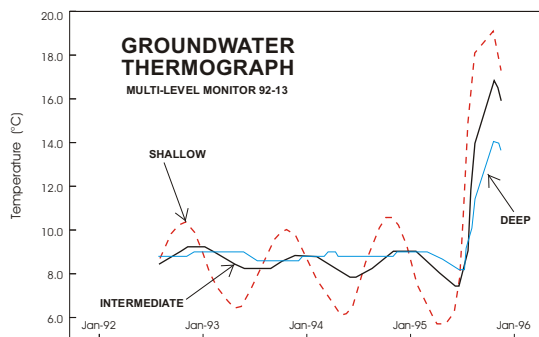
The Mill Creek Aggregates property, owned by the University of Guelph, is approximately 189 ha in size, and is located in the Township of Puslinch near Guelph, Ontario. This area is underlain by high quality sand and gravel resources that extend below the water table. Mill Creek, which traverses the northern and western portions of the property, is classified as a cold water creek that sustains a brook trout and brown trout fishery. There is also part of a Class 1 wetland on the property adjacent to Mill Creek. The cold water fishery habitat in Mill Creek is sustained, in part, by the year-round discharge of groundwater into the creek bed, and the wetland is maintained, in part, by the presence of a high water table condition. The protection of this sensitive environment was of paramount importance during the design of the aggregate extraction operation.

## APPROACH

Following a detailed investigation and impact assessment by a multi-disciplinary team of experts, and a lengthy Ontario Municipal Board hearing, the property was duly licensed and is now operated by Dufferin Aggregates. The extraction operation has been designed in a series of phases, commencing in an area removed from the sensitive creek and wetlands, and a comprehensive monitoring program has been established at the site. Three key parameters to be monitored are: (i) the movement of a thermal plume adjacent to the lakes that develop as extraction proceeds below the water table; (ii) the impact that extraction has on hydraulic gradients within the sand and gravel aquifer and groundwater discharge to Mill Creek, and (iii) the natural fluctuation due to seasonal variation that occurs in water levels, hydraulic gradients and groundwater discharge to Mill Creek.

## SOLUTION

A comprehensive network of groundwater monitors has been established at key locations across the property. The network includes conventional piezometers and standpipes for water levels, shallow drivepoint monitors in the creek bed for the measurement of hydraulic gradients, groundwater temperature and discharge to Mill Creek, and pressure/temperature transducers and electronic data loggers for continuous monitoring of hydraulic head and thermal changes in the aquifer as extraction proceeds.



By monitoring seasonal and long-term changes in the aquifer adjacent to the extraction operation, it will be possible to refine impact predictions with respect to Mill Creek and wetlands before the extraction approaches these more sensitive areas. If necessary, the extraction operation can be modified to mitigate potential impacts before they occur. This site is providing an excellent opportunity to monitor and assess the interaction between a sensitive natural environment and a well designed and managed aggregate extraction operation.