1.5 Surficial Geology

During the Pleistocene Epoch of the Quaternary Period, the sea level fell as much as 300 feet due to the amassing of ice sheets in the Northern Hemisphere. The advance of ice caused the erosion of hills and the deposition of till and stratified deposits (Plate 1.5.1). The stratified deposits include: deltas, where meltwater streams entered glacial lakes; lacustrine fan deposits, where meltwater issued directly into a glacial lake from a submerged portion of the glacier front; lakebed deposits, where suspended silt and clay settled through the water column at distance from where the meltwater entered the lake; fluvial deposits, where sediment-laden water issued from a glacier and settled in and along braided streams; and ice-contact deposits, where water-borne deposition occurred against or within a cavity in the ice (Stanford *et al*. 1990). This last type includes kames and eskers.

Unlike some other portions of the Newark Basin, such as WMA#6 and WMA#7, the glacial lakes were not very wide (Stanford 1994). Post-glacial fluvial deposits cover most of the former lakebeds. The deltaic deposits stand in relief, testifying to the former depth of the glacial lakes.

Meltwater from the retreating glacial front often achieved rather great velocities, enabling it to entrain and subsequently deposit well-stratified sands and gravels. These deposits form prolific aquifers (Nichols 1968; Stanford *et al*. 1990) vulnerable to the propagation of contamination, that provide baseflow to portions of the Saddle River, Hohokus Brook, and the Lower Passaic River, where the aquifer water levels are not lowered by pumping at supply wells (Reed *et al*. 2001).

In other areas, sheets of glacial till may form a poor surficial aquifer, where sufficiently thick. Elsewhere, the till is not thick enough to provide a sustainable supply of water, but it does provide some recharge to underlying aquifers, including stratified drift and the bedrock (Vecchioli and Miller 1973).

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