



ground water

Steady Flow to a Well Near a Stream with a Leaky Bed

by Mark Bakker¹ and Erik I. Anderson²

Abstract

We present an explicit analytic solution for steady, two-dimensional ground water flow to a well near a leaky streambed that penetrates the aquifer partially. Leakage from the stream is approximated as occurring along the centerline of the stream. The problem domain is infinite and pumping on one side of the stream induces flow on the other side. The solution includes the effects of uniform flow in the far field and a sloping hydraulic head in the stream. We use the solution to investigate the interaction between ground water and surface water in the stream, the effects of pumping on the opposite side of the stream, and the effects of the leaky streambed on the capture zone envelope of the well. We develop a relationship between parameters such that the pumping well will not capture water from the stream, or from the opposite side of the stream. When the discharge of the well is large enough to capture water from the stream, the shape of the capture zone envelope depends on flow conditions on the side of the stream opposite the well.
