In this thesis, I focused on numerical modelling of groundwater flow in the vicinity of groundwater circulation well (GCW). The thesis can be devided to two parts. In the first one, I created a simple numerical model of GCW. I used a cylindrical flow domain because of the radial symmetry of the problem. The task was to find out which parameters have the biggest influence on groundwater flow. It was found that the hydrogeological settings and hydraulic properties have more considerable effect on GW flow than the well construction parameters. Distance between the well screens is the only important construction parameter, other parameters can be neglected. However, we cannot neglect the influence of hydraulic properties of the porous medium. Considering the radius of influence of GCW, the presence of aquitards and anisotropy of layers affect the groundwater flow around the well seriously. These two parameters cause the extension of the radius of influence, which leads to a longer path of the particle of water. The travel time of particles increases too this slows down the remediation. A big influence has also an intensity of natural groundwater flow in the area because it decreases the radius of influence of the well. In the second part I created a numerical model of pilot site Velká Hleďsebe to investigate the efficiency of GCW as a remediation technology. On the base of the model results it can be shown that GCW technology can hardly be recommended for this area. The reasons are poor hydrogeological settings and bad hydraulic properties (low permeability).