Arnager Greensand consists of unconsolidated, poorly sorted fine-grained, glauconitic quartz sand, often silty or clayey, with a few horizons of cemented coarse-grained sand. Samples from the upper part of the Arnager Greensand were used for this study to estimate permeability from microscopic images. Backscattered Scanning Electron Microscope images from polished thin-sections were acquired for image analysis with the software PIPPIN(R). Differences in grey levels owing to density differences allowed us to estimate porosity, clay and particle content. The images were simplified into two phases, pores and particles, and the specific surface of the solid phase was calculated. We used the Kozeny Equation to calculate the permeability. The petrophysical properties, porosity and permeability obtained from image analysis were compared to results using laboratory methods. The 150x magnification of the image cannot resolve the microporosity within the clay fraction, so we suggest that the imaged porosity at 150x magnification is close to the effective porosity for permeability assessment. The H porosity, however, represents the total porosity of the Arnager Greensand. For permeability estimation, a local permeability was calculated for each image. For calculation of the plug scale permeability, we compare three different averaging methods: arithmetic, harmonic, and geometric mean. In every case, the calculated permeability overestimates the measured permeability. Only the lowest calculated local permeabilities correspond to the measured permeabilities, suggesting that the overall permeability for these samples is governed by the least permeable parts. (C) 1999 Elsevier Science Ltd. All rights reserved.