The aim of this thesis is to give an overview of how the measured soil resistivity of a test area can be used to get a good approximation of the real distribution of soil resistivity in a model. This approximation is the reference model to compare different, simplified models in their behaviour of the surface potential distribution. The effect of this simplification on the error is shown to avoid dimensioning errors of earthing systems.

This work contributes to the question either detailed ground investigation is needed or not.

The following questions and goals are defined:

- How can one derive the "real" resistivity from the apparent resistivity?
- How can the soil model be implemented for a numerical simulation process?
- How does the arbitrary resistivity distribution influence the surface potential?
- What is the influence if the soil model will be simplified (e.g. homogeneous, layered)?

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1. Apparent resistivity Minimum - $\rho = 122\,\Omega\text{m}$
2. Apparent resistivity Maximum - $\rho = 287\,\Omega\text{m}$
3. Apparent resistivity Average - $\rho = 210\,\Omega\text{m}$
4. Apparent resistivity Layered - average each layer
5. Apparent resistivity Layered - average layer 1-2
6. Inversion model resistivity Blocks
7. Inversion model resistivity Average - $\rho = 242\,\Omega\text{m}$
8. Inversion model resistivity Layered - average each layer