



COMMISSION INTERNATIONALE
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Leendert de Boerspolder

Failure and pre-failure of a dyke on soft subsoil

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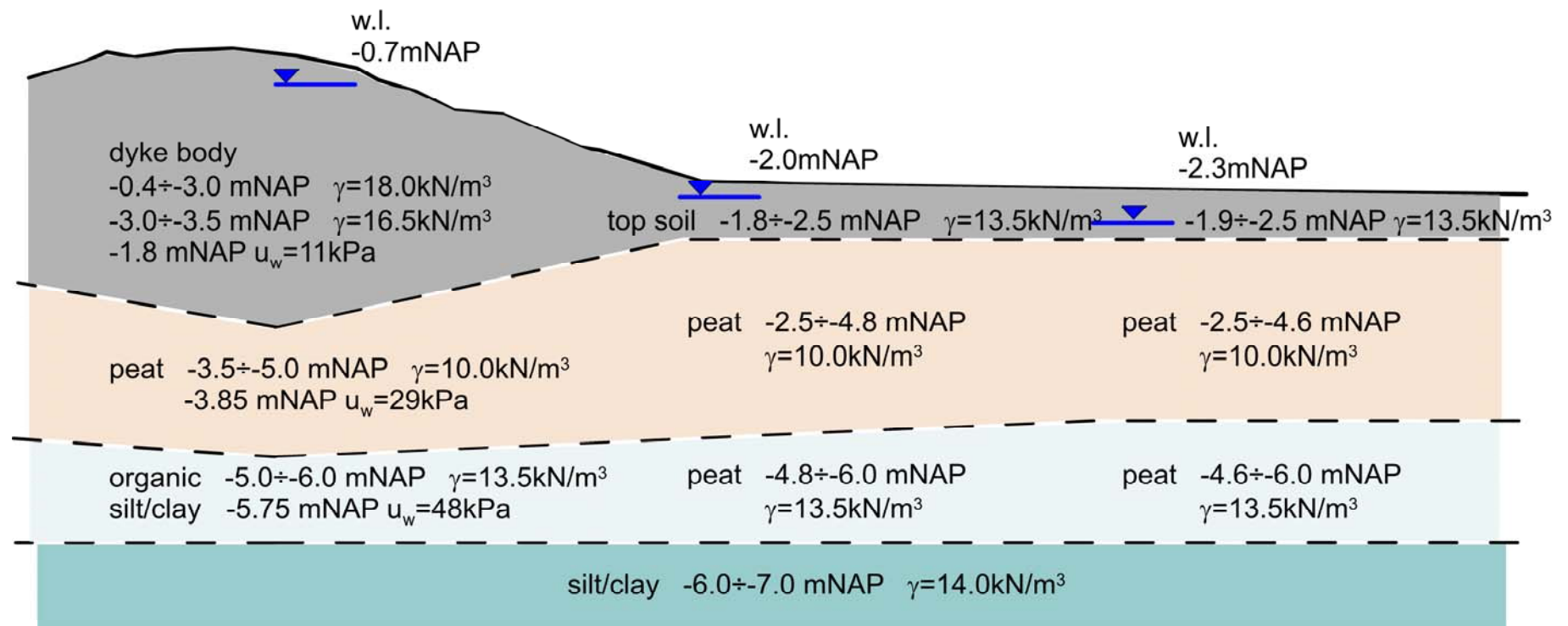


Leendert de Boerspolder – HH Rijnland

A polder protected by dykes, which had to be flooded, was offered to perform a full scale pre-failure and failure test to assess current models for the geotechnical response of the earth structure



Schematic Geotechnical Model



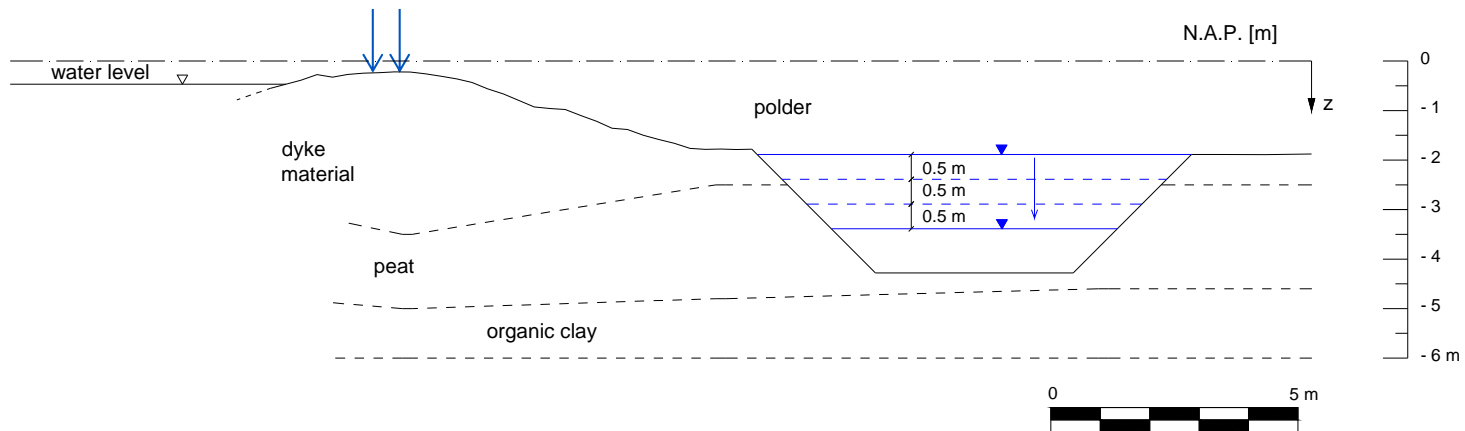
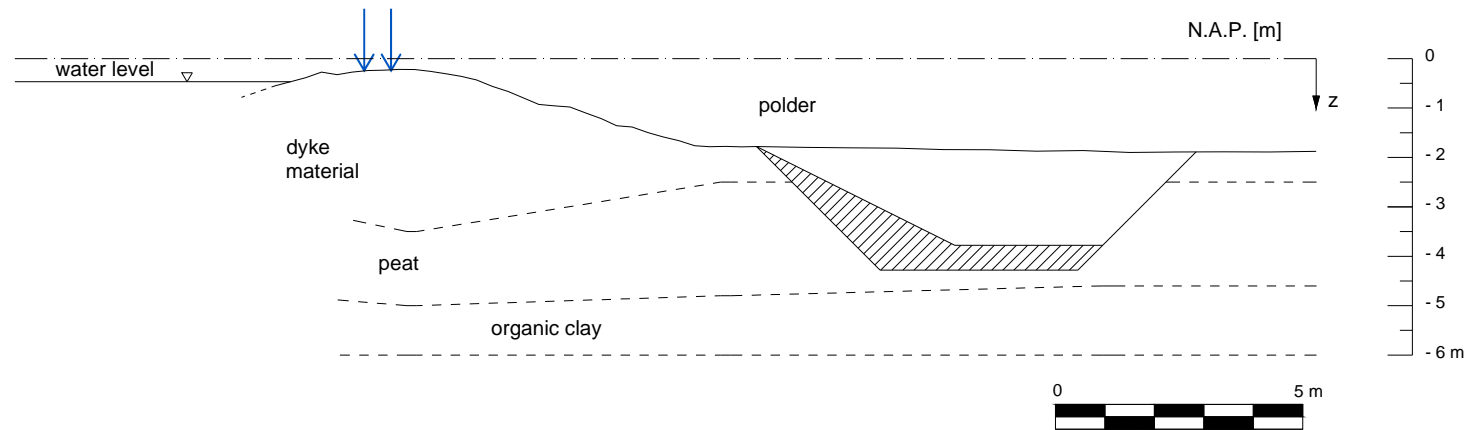
Design of the stress test

Wetting – staged excavation – staged pumping



Excavation 3: 12/10/2015

Pumping 3: 14/10/2015



Main questions

Part I: Failure

When did failure occur?

What was the role of pore pressure?

How accurately do current models for strength predict failure?

Part II: Pre-failure

What material models fit the best the subsoil and material behaviour observed in the laboratory?

Are laboratory tests representative of the behaviour of the material in the field?

Can the pre-failure displacements and pore pressures be predicted accurately with current models?

Complementary questions

Part III: Geometry and Geotechnical model

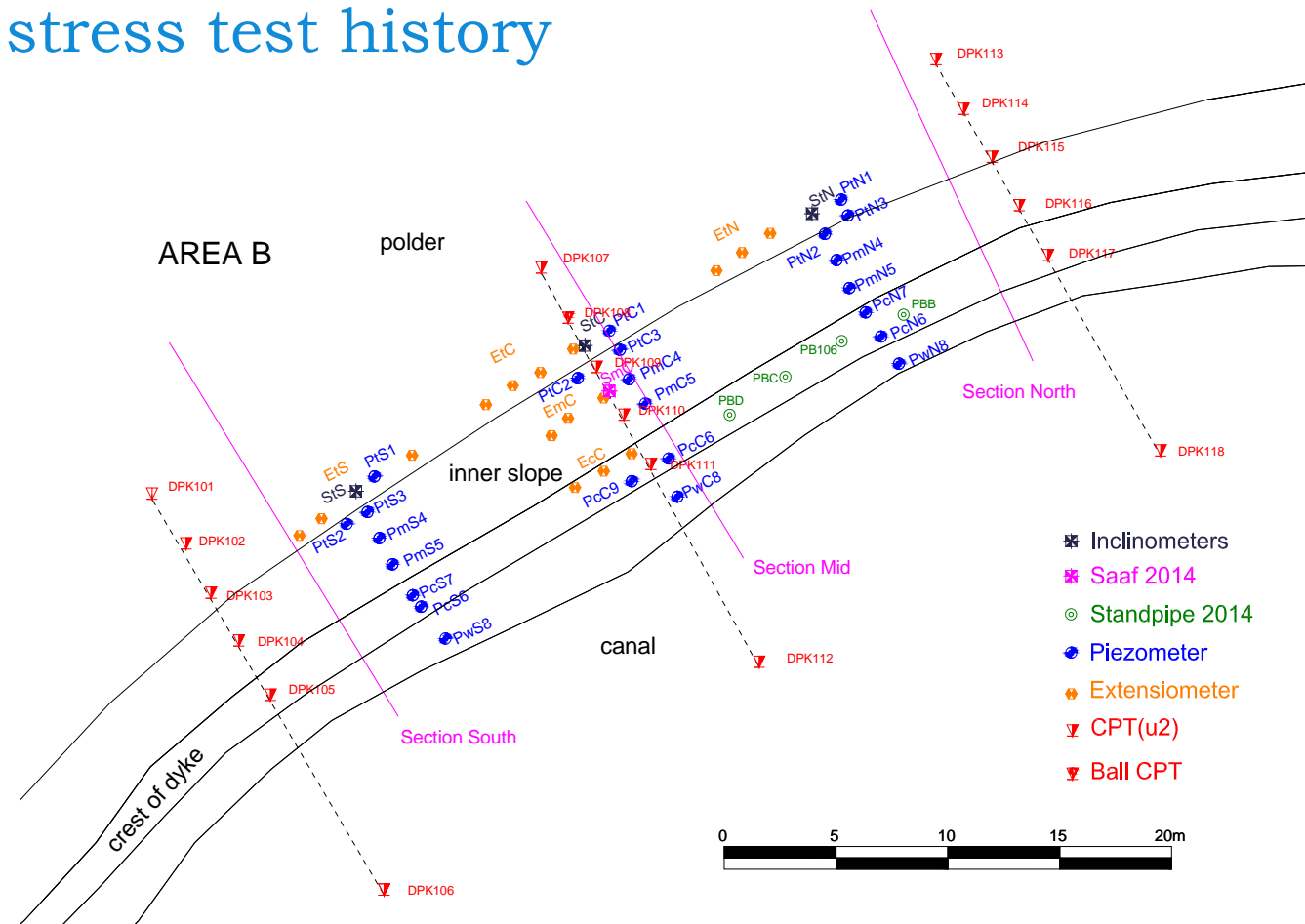
Does the true 3D geometry of the dyke influence significantly the response of the dyke during the stress test and at failure?

Can we get better prediction of pre-failure and failure including a 3D geometry of the geotechnical system?

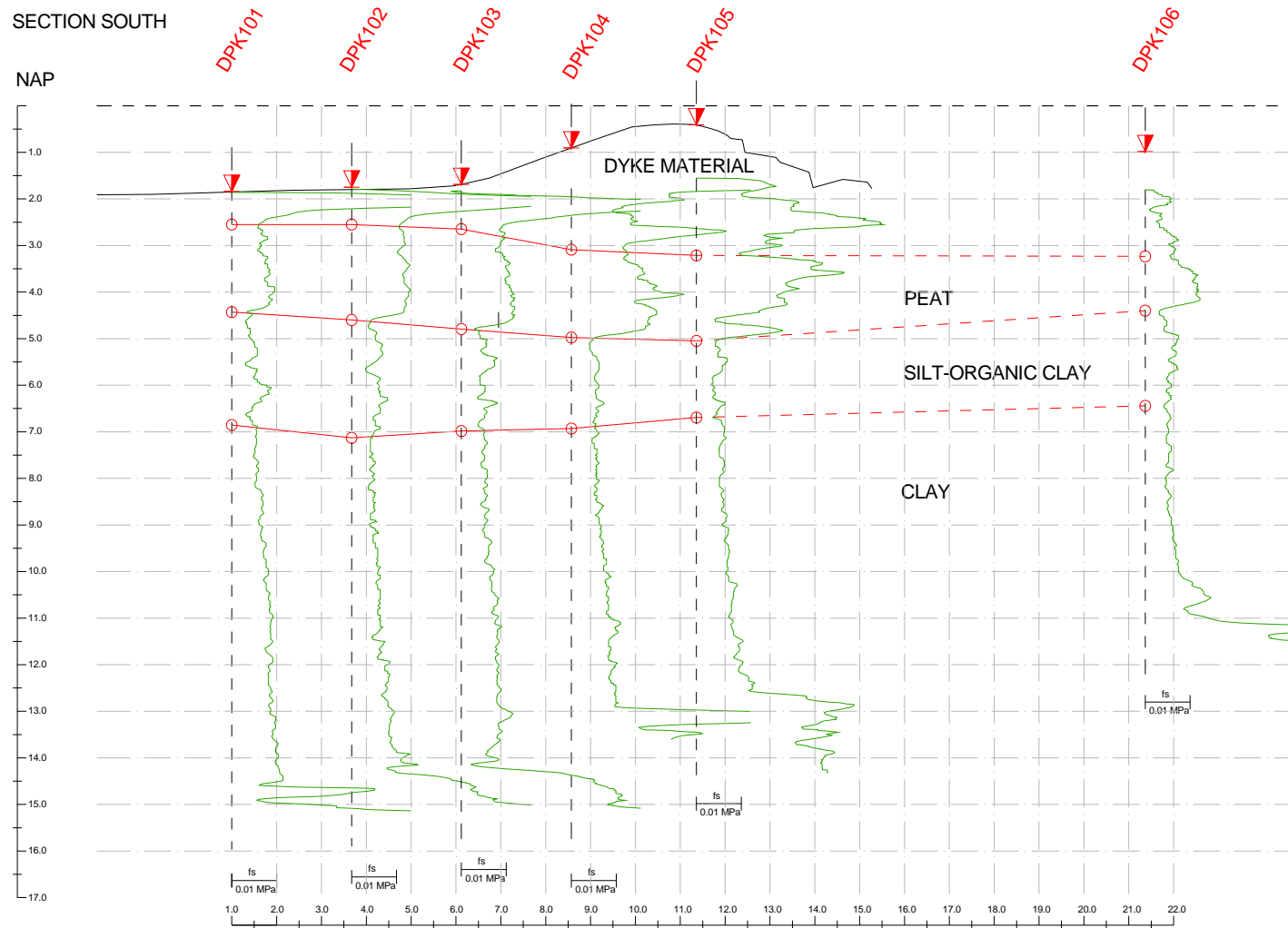
Which elements of the models are most affected by uncertainty?

Available information

Geometry, site investigation, laboratory data, and selected monitoring data on three cross-sections, complete stress test history

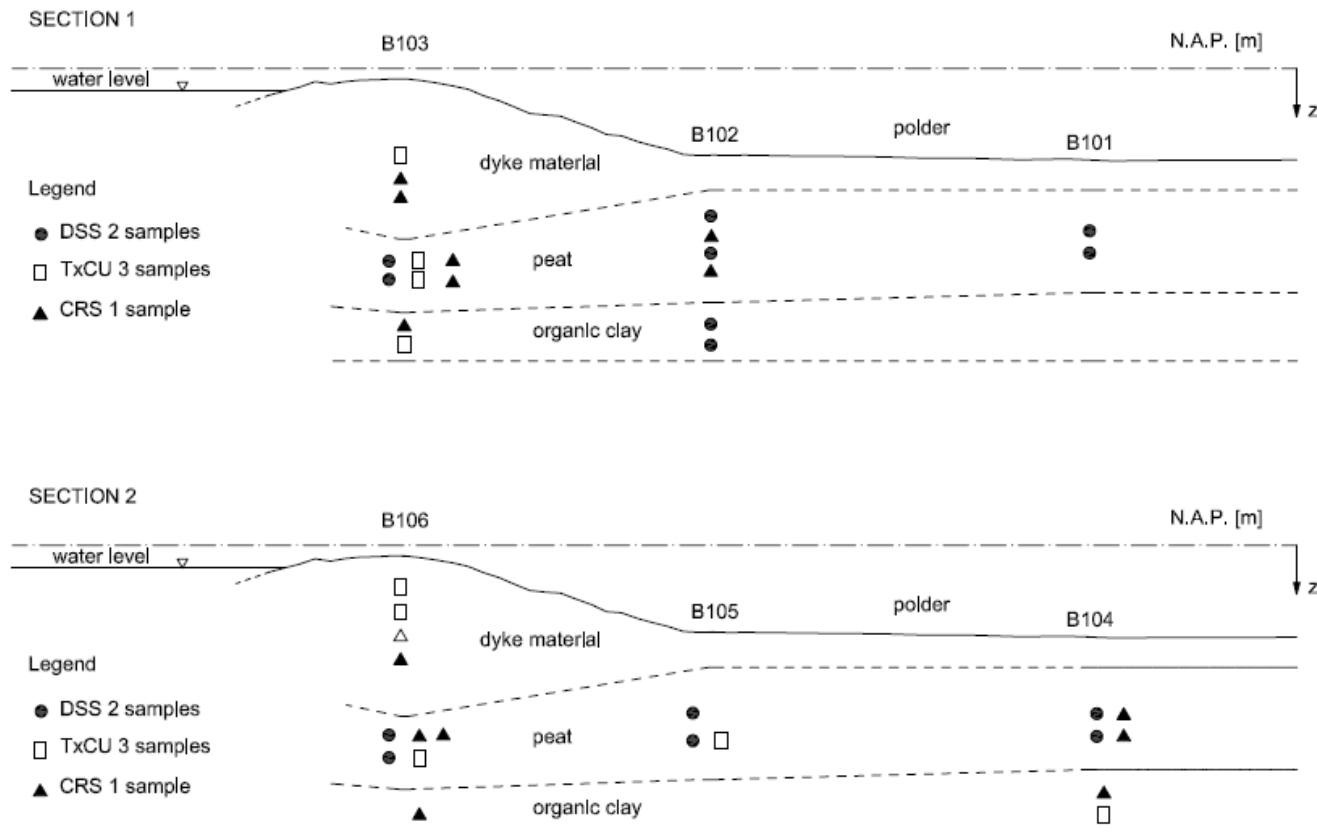


Site investigation: CPTu



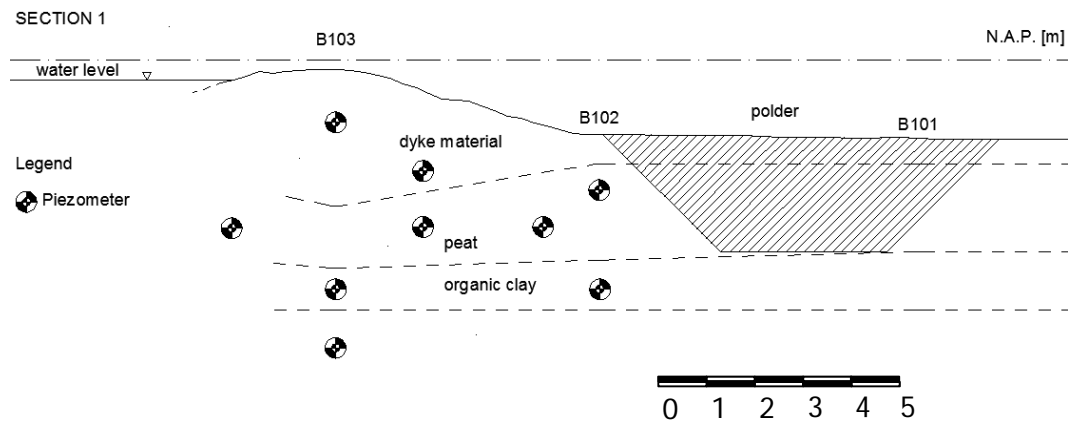
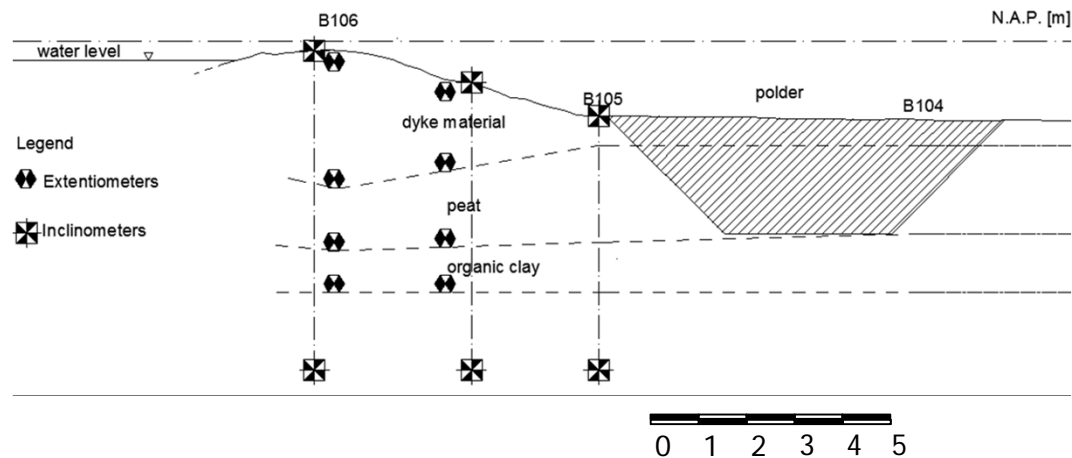
Laboratory testing

Soil classification data, Triaxial CU, Direct Simple Shear, Constant Rate of Strain and Incremental Loading Oedometer Tests



Relevant monitoring data

Inclinometers – Extensometers – Piezometers



Acknowledgments

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stowa



Hoogheemraadschap van
Rijnland



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