BIONICS

BIOlogical and eNgineering Impacts of Climate on Slopes

Climate predictions

Full and model-scale testing and instrumentation

Climate simulation

Validated numerical modelling of slope stability for predicted future climates
Numerical Slope Modelling

Objectives:
Accurately predict the pore pressures
Use recorded weather data
Apply generated surface pore pressures to a geotechnical model
Calculate the mechanical response
Numerical modelling – Climate and permeability inputs

![Graph showing rainfall comparison between future and present climates, with observed data as well.](image1)

![Graph illustrating suction kPa against depth for different permeability inputs.](image2)

![Graph depicting head (m) vs. depth for two different permeability groups.](image3)

![Diagram showing suction kPa vs. depth for two permeability groups, with observations for September 2003.](image4)
Modelling BIONICS data
Transfer of pore pressures to FLAC tp flow
iSMART
INFRASTRUCTURE SLOPES: SUSTAINABLE MANAGEMENT AND RESILIENCE ASSESSMENT
A LONG-TERM VISION........
OBJECTIVES

1. Obtain benchmark datasets from 5 slopes
2. Develop conceptual and numerical models of the near surface processes
3. Develop conceptual models of the different mechanisms of movement and failure
4. Construct numerical whole-slope models for the instrumented sites
5. Model representative future slopes
6. Make recommendations on the design, management, adaptation and maintenance of clay slopes
THE SITES

Newbury road cutting

Loughbrickland road cutting

BIONICS model embankment

Great Central Railway embankment

Craigmore Railway cutting

Hawkwell Railway embankment
PROJECT INTERACTIONS

Stakeholder group

Scale 1
Work-package 1: User impact and management

Scale 2
Work-package 2: Understanding material behaviour
Work-package 3: Understanding slope systems behaviour

Scale 3
Work-package 4: Asset management strategies

Wider research user community