The Problem

• High-plasticity clay infrastructure earthwork assets are deteriorating due to seasonal pore water pressure cycles causing seasonal ratcheting.
• The mechanism of seasonal ratcheting and long-term behaviour of slopes due to different weather patterns (i.e. climate change) is not well understood.
• Understanding slope deterioration rates and where slopes are within their life-cycle is critical for earthwork asset management strategies (see Figure 1).

The Contribution

• Seasonal wetting and drying stress cycles can lead to mobilisation of post-peak strength and progressive failure in clay slopes.
• Seasonal stress cycles will change due to climate change. We have looked at the effect of different weather sequences on slope behaviour and shown that failure occurred earlier in a model considering climate change (i.e. wetter winters and drier summers) (see Figure 3).

The Solution

• Validated numerical modelling approaches can be used to investigate long-term slope behaviour.
• The mechanism of seasonal ratcheting (i.e. hydrogeological stress cycles causing displacements and progressive failure have been captured in the modelling approach presented.

References:

