

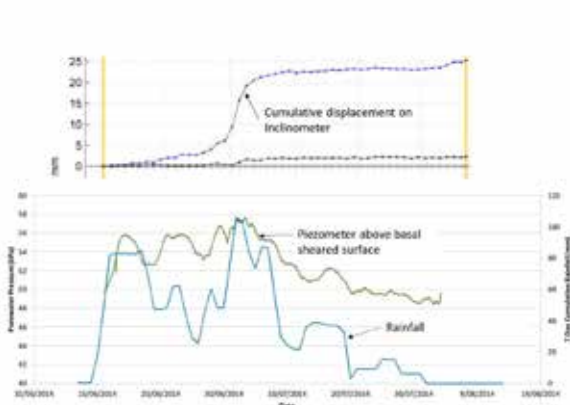
ShapeArray

Background

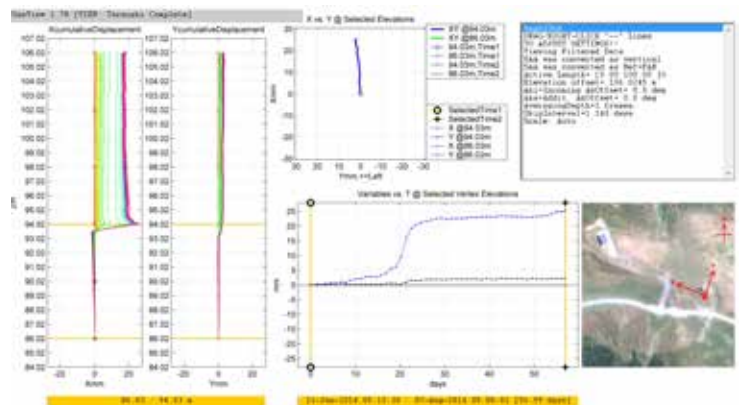
Two main gas lines run along the ridge of the coastline in Pukearuhe. In a nearby open paddock, a large, active landslide is located, measuring 500m long by 200m wide. For the purpose of landslide stabilisation to mitigate damage to the gas lines, assessments were undertaken by Tonkin + Taylor to inform a design for drainage.

A measurement option was needed that could withstand movement in the order of 80mm/year, rendering a regular Inclinometer unsuitable. With this in mind, the ShapeArray (formerly ShapeAccelArray) was chosen, and installed in conjunction with vibrating wire piezometers (VWP) and a rain gauge. Using telemetry, these instruments remotely provided data at short time intervals, removing the need for manual readings.

While it was already assumed that groundwater pressure was affecting the landslide movement, it was important to ascertain the amount of groundwater pressure required to trigger movement. By comparing information from the ShapeArray, VWP and rain gauge, the data could provide a better understanding of the intensity and duration of rainfall – and potentially the piezometric pressures - required to trigger movement events. This information informed the drainage design, to keep the pressure below this level.



Plots vs time - monitoring results from the ShapeArray Inclinometer compared against piezometer readings and rainfall data.



Output display for ShapeArray inclinometer

Ongoing Benefits:

While the submitted design was not implemented, the ShapeArray continues to provide important data. Used alongside information collected by strain gauges for the structural engineers, it supplies information about ongoing movement, which can be compared against known tolerances. This helps to inform when repairs and maintenance are required.



Looking upslope. Gently sloping grassed area on top with active landslide area visible in the center of the photo.