

Case Study

Earthen Dam in Spain Seepage Investigation

Willowstick characterizes seepage flow paths through and around the dam

The Background

A large utility company in Spain had an earthen dam that was seeping water. They wanted to gain a better understanding of where seepage was occurring.

Of significant importance was the desire to characterize zones of high porosity and any preferential seepage flow paths along the full length of the embankment. An accurate understanding of the seepage conditions would help with monitoring and remediating areas of the embankment.

Seepage through or under a dam can destroy the structure if it is not remediated immediately. Traditional methods for characterizing seepage flow can be both expensive and time consuming. For this reason, the utility company and consulting engineers used traditional geophysics and the Willowstick method to investigate where and at what depth the seepage is flowing.



The Solution

Willowstick surveyed the whole length of the dam to characterize all seepage flow paths through and around the structure.

The Willowstick technology energizes the

groundwater of interest directly with an alternating electric current. Groundwater tends to be far more electrically conductive than the surrounding rock or earthen materials. This causes the electric current to gather in and flow through any subsurface water-bearing features and generate a magnetic field.

This magnetic field data is used to generate maps and 3D models of the subsurface groundwater conditions, including any preferential flow paths. There is no need for well drilling, large equipment, or extra personnel to manage.

The Results

The Willowstick investigation identified four seepage zones. Seep Zone 1 bypass the dam around the north end of the embankment. Seep Zones 2, 3, and 4 pass beneath the dam's cutoff trench in three specific locations.

The surveys identified both the location and the depth of these seepage flow paths.

From start of fieldwork to delivery of the report was less than six weeks. This represents a substantial time and cost savings when compared to drilling.

The seepage investigation provided the client with new insights and intelligence about the subsurface conditions at the site. The survey results also act as a baseline to which they can compare conditions in the future, such as after remediation or when seepage flow rates or turbidity change.

