willowstick

Case Study

Laurel Bed Dam
Seepage Study

Virginia, USA

Willowstick provides the exact coordinates for a successful grouting remediation

Draining the lake to prevent a sunny day break

Froehling & Robertson Inc. were engaged by the Virginia Department of Game and Inland Fisheries to remediate seepage paths at the Laurel Bed Dam.

The dam had been leaking in in multiple locations at a cumulative rate of 500 gpm. Because of the high risk of a sudden sunny day break, the dam owners had already begun draining the lake. If the dam had failed, 35 homes and businesses in the valley below the dam could have been completely washed away, along with some treasured trout streams and forest.

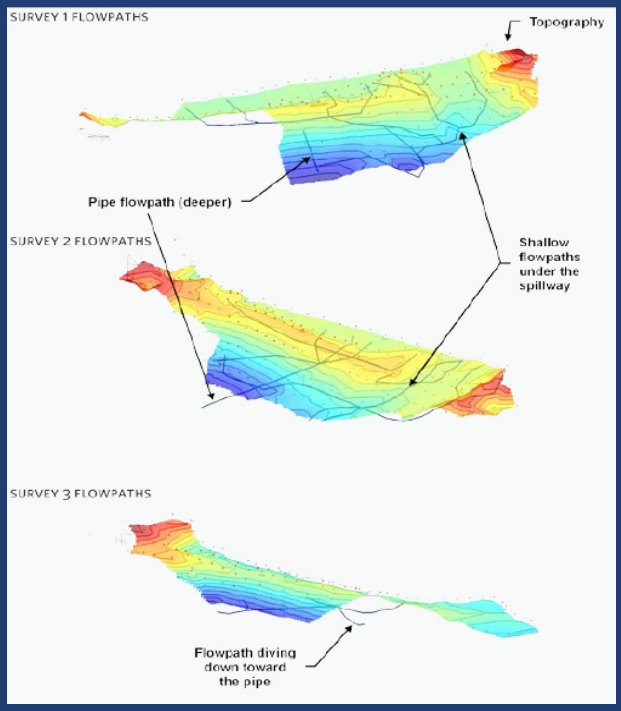
A history of failed grouting attempts

Laurel Bed Dam had a history of unsuccessful grouting attempts. Engineers could make educated guesses about the locations of the seepage paths, but they needed more accurate information to conserve their remediation budget and stop the seepage effectively.

Seismic solutions were good at studying soils, but couldn't provide focused maps for groundwater.

Resistivity was less effective because of the dam's concrete spillway. It was more suitable for locating underground tanks, bedrock pinnacles, and zones of

deep saturated soil, but the dam's rebar and pipes would interfere with the readings. It didn't light up the water directly.



Willowstick provided accurate maps and 3D groundwater models

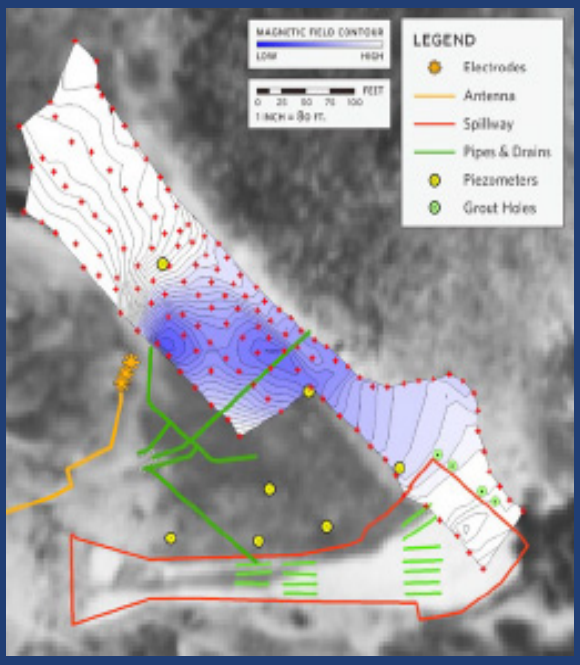
The Willowstick technology found two distinct pathways of seepage. The owners were most interested in finding out where the seepage paths began and ended. Because Willowstick energizes the groundwater directly, they were able to get a clearer view of the groundwater flow paths without interference from the dam's spillway and rebar. Willowstick provided the engineers a specific groundwater map showing both vertical and horizontal locations.

Effective remediation was applied at a lower cost than anticipated

The dam owners did a targeted cement grouting program with much more confidence than before. "We feel it did a very effective job, and the embankment is now safe," said the owner's lead engineer. "Willowstick gave us the specific target area to grout. The remediation work has shown that Willowstick was accurate. It matched up really well.

"Our total remediation cost was about $1.6M, but our initial estimate was about $2.2M. Without Willowstick, we would have wasted money with more unsuccessful grouting attempts over a broader area. That gets expensive."

Something more valuable than the money saved: "What it told us about our dam"



"Even beyond the cost savings, what Willowstick told us about our dam and the potential we had to do more to make it safer was well worth the time and investment. It gave us confidence in the things that we did to fix that dam.

"The worst thing about geotechnical analysis is that you really only get a small amount of information limited to the location around a 4 inch bore hole. You really can only say, 'That's what we have here.' You drill another bore hole 100 feet away and say, 'That's what we have there.' You can only interpret what's probably in between with some level of certainty.

"Being able to model water movement under the ground, particularly in something dangerous like a dam, is worth a lot to us as owners.

"Even if I didn't actually save any money, it was worth it for what we learned from it and the ability to feel better about the safety of the dam."