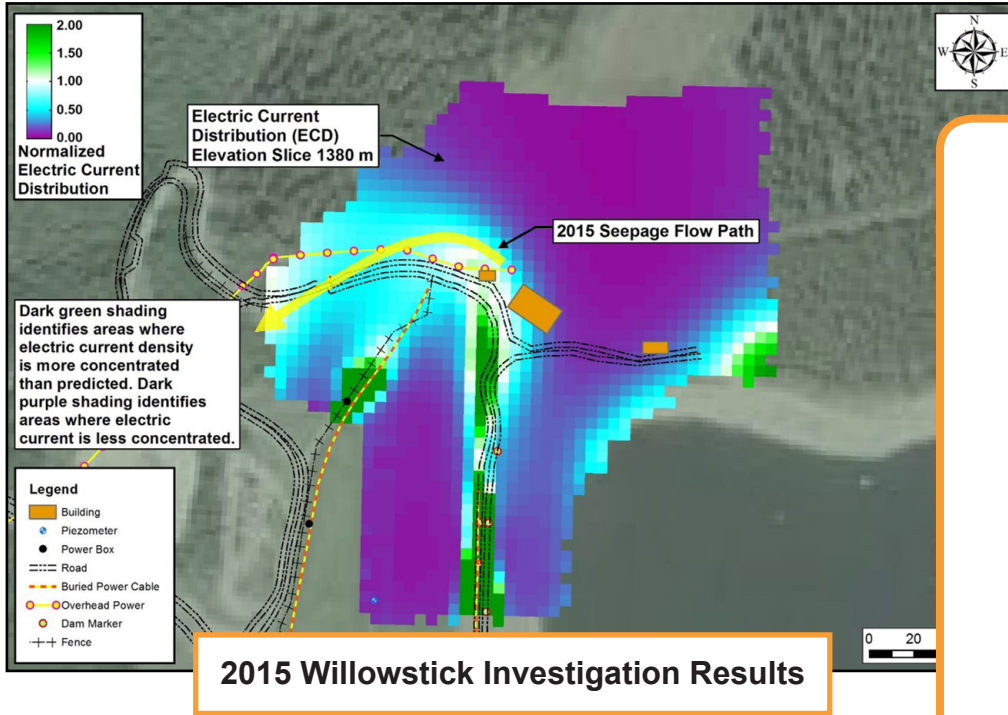


USING WILLOWSTICK INVESTIGATIONS TO TARGET REMEDIATION AND EVALUATE ITS EFFECTIVENESS



SUMMARY

LOCATION
Austria

DATE
2015 & 2017

CHALLENGE

2015 – The dam had a planned underseepage, and the client wanted to know if there were preferential seepage paths

2017 – Client wanted to verify the effectiveness of the remediation grout curtain

SOLUTION

2015 – Willowstick identified an unexpected seepage path through the embankment

2017 – Willowstick found where seepage was bypassing the grout curtain

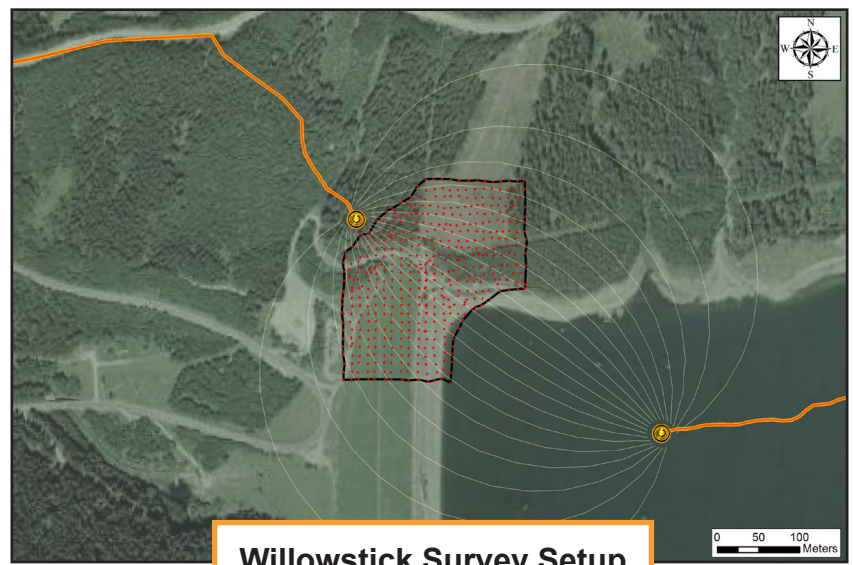
THE CHALLENGE

An earthfill dam, in Austria, had a planned underseepage, with several piezometers installed to understand the water flowing beneath the dam. The owner wanted to know if there were preferential seepage paths or if the seepage was evenly distributed in the foundation.

THE SOLUTION

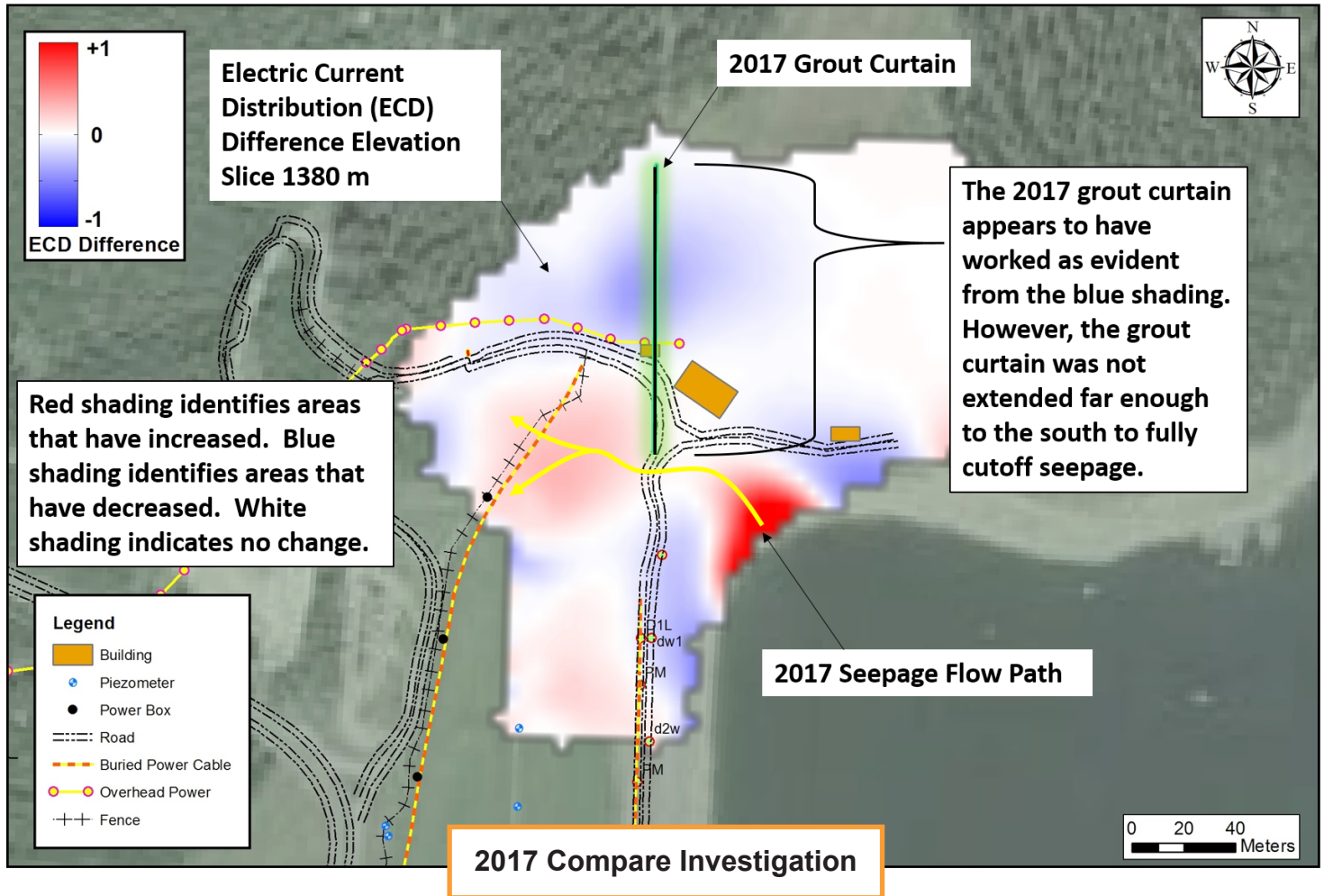
In 2015, Willowstick completed an investigation at the dam, with several surveys covering the entire dam, and identified an unexpected preferential seepage flow path through the north (right) abutment. The rest of the dam was working as designed.

Using the information from the 2015 investigation, the dam owner improved the existing grout curtain in the north abutment. The first part of the improved grout curtain was installed in 2017, but it didn't eliminate the seepage.



To further investigate the north abutment and determine the effectiveness of the 2017 grout curtain, Willowstick performed what's called a "Compare" survey. A Compare survey is similar to a traditional Willowstick survey, but it introduces the element of time. In other words, two Willowstick investigations are completed, at different times—in this case, two years—with the same survey setup. This requires the electrode positions, measurement stations, and circuit wire to be placed in the same location as they were in the previous investigation. The data from each survey is compared and any changes are highlighted.

After the completion of the Compare survey in 2017, the results were compared to the readings from the 2015 investigation. The difference between these models showed increased electrical current along a pathway just south of the 2017 improved grout curtain. The preferential seepage flow path had shifted to pass around the southern end of the grout curtain.



"The dam was commissioned in 1967, and it had been monitored for nearly 50 years. Willowstick completed an investigation, which took less than a month, and they came up with a completely new theory. After reviewing all the measurements with this new perspective and drilling exploration wells, we confirmed the new theory. The crew on site were very professional, and they responded quickly to questions. Results were presented soon after field work was completed, and the presentation, which included an online conference call, was very easy to understand"

Florian Landstorfer
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